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SPACE-BASED SURVEILLANCE AND TRACKING SYSTEM (SSTS)

AUGUST 1987

STRATEGIC DEFENSE INITIATIVE ORGANIZATION
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This Environmental Assessment documents the results of an assessment of the potential for the magnitude of impacts from Demonstration/Validation activities of the Space-Based Surveillance and Tracking System (SSTS), August 1987.

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Responsible Agency: Strategic Defense Initiative Organization

Proposed Action: Conduct Demonstration/Validation tests of the Space-based Surveillance and Tracking System (SSTS) technology.

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Abstract: The Strategic Defense Initiative Organization (SDIO) and its proponents (the U.S. Army and the U.S. Air Force) plan to conduct Demonstration/Validation tests of the SSTS technology. These tests will demonstrate the ability of the technology to perform required tasks, and will validate a future decision on whether to proceed with Full-Scale Development. Demonstration/Validation tests would be conducted at the Arnold Engineering Development Center, Nevada Test Site, Vandenberg Air Force Base/Western Test Range, Cape Canaveral Air Force Station/Eastern Test Range, Kennedy Space Center, National Test Facility, and at contractor facilities. Tests would include analyses, simulations, component/ assembly tests, and flight tests. This document addresses the potential environmental consequences of the Demonstration/ Validation testing of the SSTS technology.

Available to the Public: August 1987

EXECUTIVE SUMMARY

INTRODUCTION

The National Environmental Policy Act, the Council on Environmental Quality regulations implementing the Act (40 CFR 1500-1508), and the Department of Defense (DoD) Directive 6050.1 which supplements these regulations, direct that DoD officials take into account environmental consequences when authorizing or approving major Federal actions in the United States. Accordingly, this Environmental Assessment analyzes the potential environmental consequences of a proposed transition from Concept Exploration to Demonstration/Validation of the Space-based Surveillance and Tracking System (SSTS), one of the technologies being considered in the Strategic Defense Initiative program. The tests and evaluations associated with Demonstration/Validation will be in accordance with the Antiballistic Missile Treaty and are currently structured to conform to the restrictive interpretation of the Treaty. The decision to proceed to Demonstration/Validation for SSTS would not preclude other technologies, nor would it mandate the eventual Full-Scale Development or Production/Deployment of SSTS.

BACKGROUND

The President's announcement of a Strategic Defense Initiative on March 23, 1983, initiated an extensive research program to determine the feasibility of developing an effective ballistic missile defense system to protect the United States and its allies from enemy missile attack. The Strategic Defense Initiative Organization was established to plan, organize, coordinate, direct, and enhance the research and testing of technologies applicable to strategic defense. Future implementation of a Strategic Defense System would be based on the Strategic Defense Initiative research program.

Many technologies currently are being investigated. Among the technologies being considered for Demonstration/Validation are space-based technologies:

- o Boost Surveillance and Tracking System (BSTS)
- o Space-based Surveillance and Tracking System (SSTS)
- o Space-Based Interceptor (SBI)

and ground-based technologies:

- o Exoatmospheric Reentry Vehicle Interception System (ERIS)
- o Ground-based Surveillance and Tracking System (GSTS)
- o Battle Management/Command and Control, and Communications (BM/C^3).

DoD Directive 5000.1 calls for a staged approach to the DoD acquisition process. In keeping with that mandate, DoD's major system acquisition process consists of four distinct stages: Concept Exploration, Demonstration/Validation, Full-Scale Development, and Production/Deployment. These four stages are separated by three major decision points (Milestones I, II, and III). Prior to Milestone I, the Defense Acquisition Board will review the

results of Concept Exploration and decide whether the subject technology will be carried forward into Demonstration/Validation or remain in the Concept Exploration stage. The SSTS Strategic Defense Initiative technology is approaching the end of Concept Exploration and is preparing for Demonstration/ Validation.

PURPOSE AND NEED

The purpose of the Demonstration/Validation program for SSTS is to determine the ability of the technology to perform its intended function, and to provide the information necessary to make an informed decision whether to proceed with Full-Scale Development. These activities are the first steps needed to support a decision to develop, produce, and deploy the SSTS technology, which is integral to an effective strategic defense.

The function of SSTS would be to provide ballistic missile surveillance and tracking, as well as timely attack warning and verification. The SSTS would provide an element of one alternative space-based architecture of the proposed Strategic Defense System.

PROPOSED ACTION

The proposed action is the Demonstration/Validation program for the SSTS technology. This program would demonstrate whether the system can meet its specific performance requirements and would provide the information necessary for the Defense Acquisition Board to recommend a Milestone II decision to proceed into Full-Scale Development.

SSTS Demonstration/Validation would require fabrication and ground testing of a limited capability SSTS satellite. The satellite would be launched into space for an on-orbit evaluation. Fabrication and ground testing would take place in both contractor and government facilities. The on-orbit evaluation could utilize modified launch facilities depending on the launch vehicle/ launch location option chosen.

To date, detailed assessments of mission requirements, state-of-the-art technology, and technology and development risks have been performed as part of the SSTS Mission Definition and Requirements Analysis program, which was conducted as part of Concept Exploration. However, additional simulation, ground testing, and flight testing are required in Demonstration/Validation to address the following technological issues:

- Telescope Optics: Verify that the distortions associated with large optical elements satisfy detection and tracking requirements; verify that the optical materials performance will not degrade in a nuclear or space environment; verify that contamination buildup will not degrade element performance; verify that off-axis sources can be rejected by the baffle assembly.

- Focal Plane Arrays: Verify that a focal plane array can be constructed with adequate uniformity; verify that the array elements can be read quickly enough to satisfy detector and tracking

requirements; verify that focal plane performance will not degrade in a nuclear or space environment; verify that crosstalk in element leads will not degrade performance; verify that contamination build-up problems can be resolved.

- o Cryocoolers: Verify that the cryocooler can maintain the required operating temperature in the space environment; establish power requirements; demonstrate acceptable time between failures; verify that cryocooler performance is not degraded in a nuclear or space environment.

- o Processor: Verify that algorithms can detect and track representative targets against characteristic background; verify that processor performance will not degrade in a space or nuclear environment; verify that the processor can operate correctly when faced with common fault conditions; verify that the data processing capability of the processor can meet requirements.

The Demonstration/Validation testing activities for the SSTS program fall into four categories: analyses, simulations, component/assembly tests, and flight tests. The tests and their proposed locations are provided in Table S-1.

NO-ACTION ALTERNATIVE

The no-action alternative is to continue with Concept Exploration activities without progressing to the Demonstration/Validation stage at this time.

ENVIRONMENTAL SETTING

The test activities of the SSTS Demonstration/Validation program would be carried out at contractor facilities that have not been identified and at six government facilities (Arnold Engineering Development Center, Nevada Test Site, Vandenberg Air Force Base/Western Test Range, Kennedy Space Center, Cape Canaveral Air Force Station/Eastern Test Range, and the National Test Facility). The attributes of each of these government facilities as they relate to the proposed testing activities follow.

Arnold Engineering Development Center, located at Arnold Air Force Station, 7 miles southeast of Manchester, Tennessee, is the nation's largest complex of wind tunnels, jet and rocket engine test cells, space simulation chambers, and hyper-ballistic ranges.

The Nevada Test Site is located approximately 65 miles northwest of Las Vegas, Nevada. The main function of the site is underground testing of nuclear devices.

Vandenberg Air Force Base/Western Test Range, located on the coast of California, is the Strategic Air Command's pioneer missile base. Over 1,500 launches have been conducted at Vandenberg since 1958. Currently there are no facilities available for launching Titan IV missiles. Launch facilities for the Space Shuttle are not yet operational, but are being developed.

TABLE S-1.
DEMONSTRATION/VALIDATION TESTING FOR
SPACED-BASED SURVEILLANCE AND TRACKING SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES				LOCATIONS[1]
	Analyses	Simulations	Component/ Assembly	Flight	
Ability of SSTS platform to withstand a hostile threat	X				Contractor facility[2]
Determine the ability of the platform attitude control system to maintain specified attitude		X	Space Chamber		Contractor facility[2]
		X	Space Chamber		Arnold Engineering Development Center[3]
Telescope optics/focal plane array performance evaluation		X	Scene Generator, Space Chamber		Contractor facility[2]
		X	Scene Generator, Space Chamber		Arnold Engineering Development Center[3]

(1) Adequate facilities exist unless otherwise noted.

(2) The selected contractor will certify compliance with all Federal, State, and local environmental laws and regulations necessary for facility operations through the DoD procurement process.

(3) Facility construction or modification required (excluding minor modification).

(4) Vandenberg Air Force Base is the preferred launch site because it is easier to obtain polar orbit; either a Titan IV or the Space Shuttle could be the launch vehicle.

(5) Cape Canaveral Air Force Station and the Eastern Test Range may be utilized if Titan IV is the launch vehicle; Kennedy Space Center and the Eastern Test Range may be utilized if the Space Shuttle is the launch vehicle.

TABLE S-1 (Continued).
DEMONSTRATION/VALIDATION TESTING FOR
SPACED-BASED SURVEILLANCE AND TRACKING SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES				LOCATIONS[1]
	Analyses	Simulations	Component/ Assembly	Flight	
Develop and test ability of optic glass material to withstand nuclear and space environment			Broad-Spectrum Radiation		Nevada Test Site
Launch of a limited capability satellite to test performance against targets on non-threat trajectories				X	Vandenberg Air Force Base/Western Test Range[3,4]
				X	Cape Canaveral Air Force Station/Eastern Test Range[3,5]
				X	Kennedy Space Center[5]
Analysis and storage of data from flight tests	X	X			National Test Facility[3]

[1] Adequate facilities exist unless otherwise noted.

[2] The selected contractor will certify compliance with all Federal, State, and local environmental laws and regulations necessary for facility operations through the DoD procurement process.

[3] Facility construction or modification required (excluding minor modification).

[4] Vandenberg Air Force Base is the preferred launch site because it is easier to obtain polar orbit; either a Titan IV or the Space Shuttle could be the launch vehicle.

[5] Cape Canaveral Air Force Station and the Eastern Test Range may be utilized if Titan IV is the launch vehicle; Kennedy Space Center and the Eastern Test Range may be utilized if the Space Shuttle is the launch vehicle.

The Western Test Range includes a broad area of the Pacific Ocean which functions as a test area for space and missile operations. The range is activated by launches 60 to 70 times each year. Only that portion of the range affected by a launch is actually activated; activation consists of instructing ships and airplanes to stay out of the affected area and either sheltering or evacuating any people living in the activated area.

The Eastern Space and Missile Center is the host organization for **Cape Canaveral Air Force Station/Eastern Test Range**, as well as Patrick Air Force Base. Patrick Air Force Base provides support for the people and mission of the Eastern Space and Missile Center. Cape Canaveral Air Force Station includes a system of missile launch facilities located along the Atlantic Ocean in Brevard County, Florida.

The Eastern Test Range includes a broad area of the Atlantic Ocean which extends offshore from Patrick Air Force Base, Cape Canaveral Air Force Station, and Kennedy Space Center to the Indian Ocean. The facilities of the Test Range are used to track launches. Launch and spacecraft operations are monitored and supported by the Air Force Satellite Control Facility, the Consolidated Space Operations Center, and the MILSTAR satellite communication system.

Kennedy Space Center is located north and west of Cape Canaveral Air Force Station on Florida's east coast. The Kennedy Space Center is currently the only operational launch facility for the Space Shuttle. Kennedy Space Center has launched the Space Shuttle up to nine times per year.

The **National Test Facility** will be constructed at Falcon Air Force Station in Colorado. An interim facility will be operated out of the Consolidated Space Operations Center, also located at Falcon Air Force Station, until construction is complete.

ENVIRONMENTAL CONSEQUENCES

Many of the tests for the SSTS Demonstration/Validation program would be conducted at contractor facilities. These contractors have yet to be selected through the DoD procurement process. The contractors would be required to meet all Federal, State, and local environmental laws and regulations necessary for facility operations. If the procurement process required a selected contractor to use Federal funds to conduct an activity with a potential for significant environmental consequences, an environmental analysis of the consequences of such activities would also be required of the contractor. This analysis would be utilized by DoD in completing an environmental assessment or environmental impact statement, as appropriate.

To assess the potential for and the magnitude of impacts from Demonstration/Validation at each government facility, a two-step methodology was utilized. The first step was the application of assessment criteria to identify activities with no potential for significant environmental consequences. Activities

were deemed to present no potential for significant environmental consequences if they met all of the following criteria (i.e., all "yes" answers):

1. Are the facility and its infrastructure adequate for the proposed activity (i.e., can the tests be conducted without new construction, excluding minor modifications)?

2. Is current staffing at the facility adequate to conduct the test, excluding minor staff level adjustments?

3. Does the facility comply with existing environmental standards?

4. Are the resources of the surrounding community adequate to accommodate the proposed testing?

If a proposed test was determined to present a potential for impact (i.e., a "no" answer to any of the above questions), the second step was to evaluate the activity in the context of the following environmental considerations: air quality, water quality, biological resources, infrastructure, hazardous waste, land use, visual resources, cultural resources, noise, and socioeconomics. As a result of that evaluation, consequences were assigned to one of three categories: insignificant, mitigable, or potentially significant.

Environmental consequences were determined to be **insignificant** if, in the judgment of the analysts or as concluded in existing environmental documentation, no potential for significant environmental impacts exists. Consequences were deemed **mitigable** if concerns exist but it was determined that all potential consequences could be readily mitigated through standard procedures or by measures recommended in existing environmental documentation. If serious consequences exist that could not be readily mitigated, the activity was determined to represent **potentially significant** environmental impacts.

Demonstration/Validation test activities at **Arnold Engineering Development Center** would require construction of a new space chamber large enough to accommodate SSTS assemblies. Additional staffing may be required for the new chamber. Potential air and water quality impacts associated with construction activities appear to be **mitigable** by standard control measures. No significant impacts are expected on infrastructure, hazardous waste, land use, visual and cultural resources, noise, and socioeconomics. The environmental consequences of operation of the space chamber are not expected to be significant, based on experience with other space chambers at Arnold Engineering Development Center; however, potential impacts of construction and operation of the new space chamber will be addressed in an environmental assessment to be prepared by Arnold Engineering Development Center when engineering design is 35 to 60 percent complete.

The environmental consequences of SSTS testing at the **Nevada Test Site** would be **insignificant**. The test would include exposure of optic glass material to broad-spectrum radiation resulting from an underground nuclear test scheduled for other programs. No facility/infrastructure modification or additional staff would be required as a consequence of SSTS testing and the facility is in compliance with environmental standards.

Environmental consequences of launching either the Space Shuttle or a Titan IV from **Vandenberg Air Force Base/Western Test Range** are expected to be **mitigable.** Although the launching of either of these missiles may require construction or refurbishment of facilities, such a launch would be within the scope of the facility and represents no significant impacts to air or water quality (mitigable by standard control measures during construction) or other environmental resources. However, overall operations of Vandenberg are contributing to regional overdrawing of aquifers used for water supply. Continued regional consumption at current rates would cause depletion of the aquifers.

The use of the Western Test Range for SSTS activities will be in connection with launches from Vandenberg Air Force Base. The impacts on Western Test Range operation from SSTS activities are deemed **insignificant.**

Cape Canaveral Air Force Station/Eastern Test Range may be used for one launch utilizing a new Titan IV booster. An existing launch complex would be modified to accommodate the Titan IV launch. No new staff would be required for SSTS activities. The environmental consequences of the launch complex construction and operation have been analyzed in "Environmental Assessment for the Complementary Expendable Launch Vehicle (CELV) Program at Cape Canaveral Air Force Station," which concluded that any impacts would be mitigable. Air quality, water quality and biological resource impacts are mitigable by control measures recommended in the environmental assessment. No significant impacts are expected on infrastructure, hazardous waste, land use, visual and cultural resources, noise, or socioeconomics. The overall environmental consequences associated with SSTS Demonstration/Validation activities at Cape Canaveral Air Force Station/Eastern Test Range are deemed to be **mitigable** using the control measures described in the environmental assessment cited above.

A Space Shuttle vehicle from **Kennedy Space Center** may be used for the one launch of the SSTS. Existing facilities, staff, and infrastructure would be adequate for the launch. Environmental consequences of the Space Shuttle operation have been analyzed in "Final Environmental Impact Statement, Space Shuttle Program, April 1987," and are considered to be **insignificant.**

The environmental consequences of constructing and operating the **National Test Facility** at Falcon Air Force Station are deemed to be **mitigable.** The consequences have been analyzed in "National Test Facility Environmental Assessment," which also identifies the necessary mitigation measures. The National Test Facility would employ 2,300 workers in a new facility. Until the facility is constructed, workers would be located in existing facilities at Falcon Air Force Station. Air quality, infrastructure, and land use impacts from construction and operation would be mitigable through the use of standard control and conservation practices. No significant impacts are expected on water quality, biological resources, hazardous waste, visual and cultural resources, noise, or socioeconomics.

If the no-action alternative is selected, no significant environmental impacts are anticipated, as current Concept Exploration activities would continue with utilization of current staffing and facilities.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Development of the one SSTS satellite through the Demonstration/Validation stage would result in irreversible and irretrievable commitment of resources such as electronic components, various metallic and non-metallic structural materials, fuel, and labor. This commitment of resources is not different from those necessary for many other aerospace research and development programs; it is similar to the activities that have been carried out in previous aerospace programs over the past several years.

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1. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

The National Environmental Policy Act, the Council on Environmental Quality regulations implementing the Act (40 CFR 1500-1508), and the Department of Defense (DoD) Directive 6050.1 which supplements these regulations, direct that DoD officials take into account environmental consequences when authorizing or approving major Federal actions in the United States. Accordingly, this Environmental Assessment analyzes the potential environmental consequences of a proposed transition from Concept Exploration to Demonstration/Validation of the Space-based Surveillance and Tracking System (SSTS), one of the technologies being considered in the Strategic Defense Initiative program. The tests and evaluations associated with the Demonstration/Validation will be in accordance with the Antiballistic Missile Treaty and are currently structured to conform to the restrictive interpretation of the Treaty. The decision to proceed to Demonstration/Validation for SSTS would not preclude other technologies, nor would it mandate the eventual Full-Scale Development or Production/Deployment of SSTS.

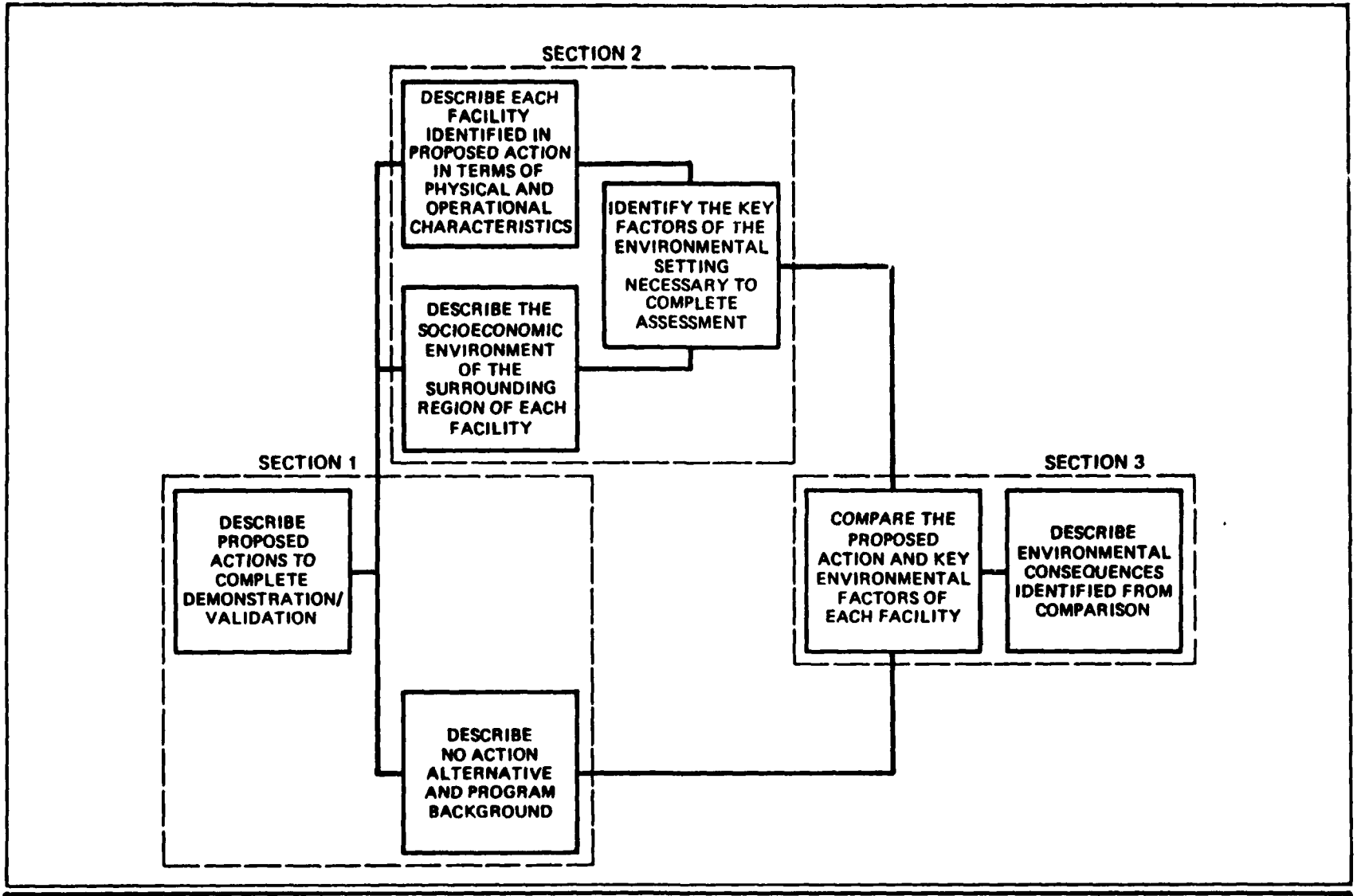
The approach followed to complete this assessment is presented in Figure 1-1. This section describes the test and evaluation activities that would be completed for SSTS and identifies the contractor and government facilities where the activities would be carried out. Section 2 characterizes those facilities and the surrounding communities and Section 3 assesses the potential environmental consequences of the activities.

Demonstration/Validation of the SSTS technology would consist of a number of tests. Descriptions of these tests were developed from documentation describing the SSTS Demonstration/Validation program and interviews with program personnel who developed the documentation. Section 1.3 describes the types of tests and their locations. Also, where possible, other factors related to the tests, such as work force or hazardous materials requirements, have been described.

The remainder of this section briefly describes the background of the Strategic Defense Initiative Program, the purpose of and need for the SSTS technology, the proposed action, and the no-action alternative.

1.1 BACKGROUND

The President's announcement of a Strategic Defense Initiative on March 23, 1983, initiated an extensive research program to determine the feasibility of developing an effective ballistic missile defense system to protect the United States and its allies from enemy missile attack. The Strategic Defense Initiative Organization was established to plan, organize, coordinate, direct, and enhance the research and testing of technologies applicable to strategic defense. Future implementation of a Strategic Defense System would be based on the Strategic Defense Initiative research program.



GENERAL APPROACH TO COMPLETE ENVIRONMENTAL ASSESSMENT

FIGURE 1-1

1.1.1 Classes of Architecture

The Strategic Defense Initiative has produced several candidate architecture options and has promoted advanced technology concepts to support these architectures. The term "architecture" refers to the function and interrelationship of individual elements or subsystems within a possible system. To date, three classes of possible architecture have been defined:

- Combined space-based and ground-based sensors and weapons to counter long-range ballistic missiles
- Ground-based weapons to counter long-range ballistic missiles
- Airborne sensors and ground-based weapons to counter shorter-range tactical ballistic missiles.

The combined space- and ground-based architectures would employ a series of satellites to sense, track, and destroy the threatening missiles and reentry vehicles (i.e., warheads) in the boost, post-boost, or midcourse phase of their trajectory. A ground-based system, which would back up the satellites, would intercept warheads in the latter part of their flight. Early evolving systems for both space- and ground-based architectures would use kinetic-energy weapons; later systems may use directed-energy weapons (lasers or particle beams).

As currently envisioned, the ground-based architecture could meet an offensive missile in the midcourse and reentry phases, although boost-phase intercept capability (by use of ground-based directed-energy weapons) is currently being investigated. A series of satellites would provide early warning, and ground-based intercept vehicles would then destroy the incoming warhead.

The third architecture would use airborne sensors to track shorter-range tactical ballistic missiles and ground-based weapons for target destruction. The shorter flight times of tactical ballistic missiles would require fast identification, tracking, discrimination, and reaction, which in turn would require greater sensor sensitivity and faster data processing.

Many technologies currently are being investigated to support the three architectures described above. Among the technologies being considered for Demonstration/Validation are space-based technologies:

- Boost Surveillance and Tracking System (BSTS)
- Space-based Surveillance and Tracking System (SSTS)
- Space-Based Interceptor (SBI)

and ground-based technologies:

- Exoatmospheric Reentry Vehicle Interception System (ERIS)
- Ground-based Surveillance and Tracking System (GSTS)
- Battle Management/Command and Control, and Communications (BM/C^3).

Among the space-based technologies, the SSTS sensors would provide tracking in the post-boost and midcourse phases of the missile trajectory. The SSTS would also discriminate among reentry vehicles, lightweight penetration aids, and space debris. The SSTS platform would consist of a telescope, a focal plane array, a cryocooler, and associated processor and communications hardware and software, as well as necessary attitude control systems. The optical system would be designed to gather electromagnetic radiation which would be focused on a plane containing infrared-sensitive detectors. The cryocooler would maintain the focal plane at the correct operating temperature. Signals from the focal plane array would be processed to determine target trajectory, as well as a number of other target characteristics. All data would be communicated to the BM/C^3 component of the Strategic Defense Initiative program for further analysis and action.

This Environmental Assessment addresses the SSTS technology. Separate Environmental Assessments have been prepared for the other technologies being considered for Demonstration/Validation. The potential cumulative environmental effects of testing several technologies at the same facility are addressed in the Strategic Defense Initiative Demonstration/Validation Program Environmental Assessments Summary.

A decision will be made as to whether the SSTS technology is ready to proceed to Demonstration/Validation based on examination of cost, schedule, readiness objectives, affordability, initial operational capability, conceptual soundness, and environmental consequences.

1.1.2 Stages of Strategic Defense Initiative Development

DoD Directive 5000.1 calls for a staged approach to the DoD acquisition process. In keeping with that mandate, DoD's major system acquisition process consists of four distinct stages: Concept Exploration, Demonstration/Validation, Full-Scale Development, and Production/Deployment. These four stages are separated by three major decision points (Milestones I, II, and III). Prior to Milestone I, the Defense Acquisition Board will review the results of Concept Exploration and decide whether the subject technology will be carried forward into Demonstration/Validation or remain in the Concept Exploration stage. The SSTS Strategic Defense Initiative technology is approaching the end of Concept Exploration and preparing for the Demonstration/Validation.

In Demonstration/Validation, the SSTS technology is tested to demonstrate its ability to perform the task. The Demonstration/Validation stage for the SSTS includes the following test techniques:

1. Analyses: Examining and evaluating data to define or refine the current knowledge of a technology

2. Simulations: The use of software models representing both the test article and the environment to determine performance abilities

3. Component/Assembly Tests: Demonstrating performance of components and assemblies under simulated conditions, such as space or battle environments

4. Flight Tests: The use of flight-qualified devices and assemblies in real flight environments to verify performance.

Some SSTS Demonstration/Validation activities may require modifications or additions to existing government facilities. Should this occur, the need for supplemental environmental evaluation would be determined in conformance with Council on Environmental Quality and DoD regulations.

1.2 PURPOSE AND NEED

The purpose of the Demonstration/Validation program for SSTS is to determine the ability of the technology to perform its intended function and to provide the information necessary to make an informed decision whether to proceed with Full-Scale Development. These activities are the first steps needed to support a decision to develop, produce, and deploy the SSTS technology, which is integral to an effective strategic defense.

The function of SSTS would be to provide ballistic missile surveillance and tracking, as well as timely attack warning and verification (Figure 1-2). The SSTS would provide an element of one alternative in the space-based weapons architecture portion of the proposed Strategic Defense System.

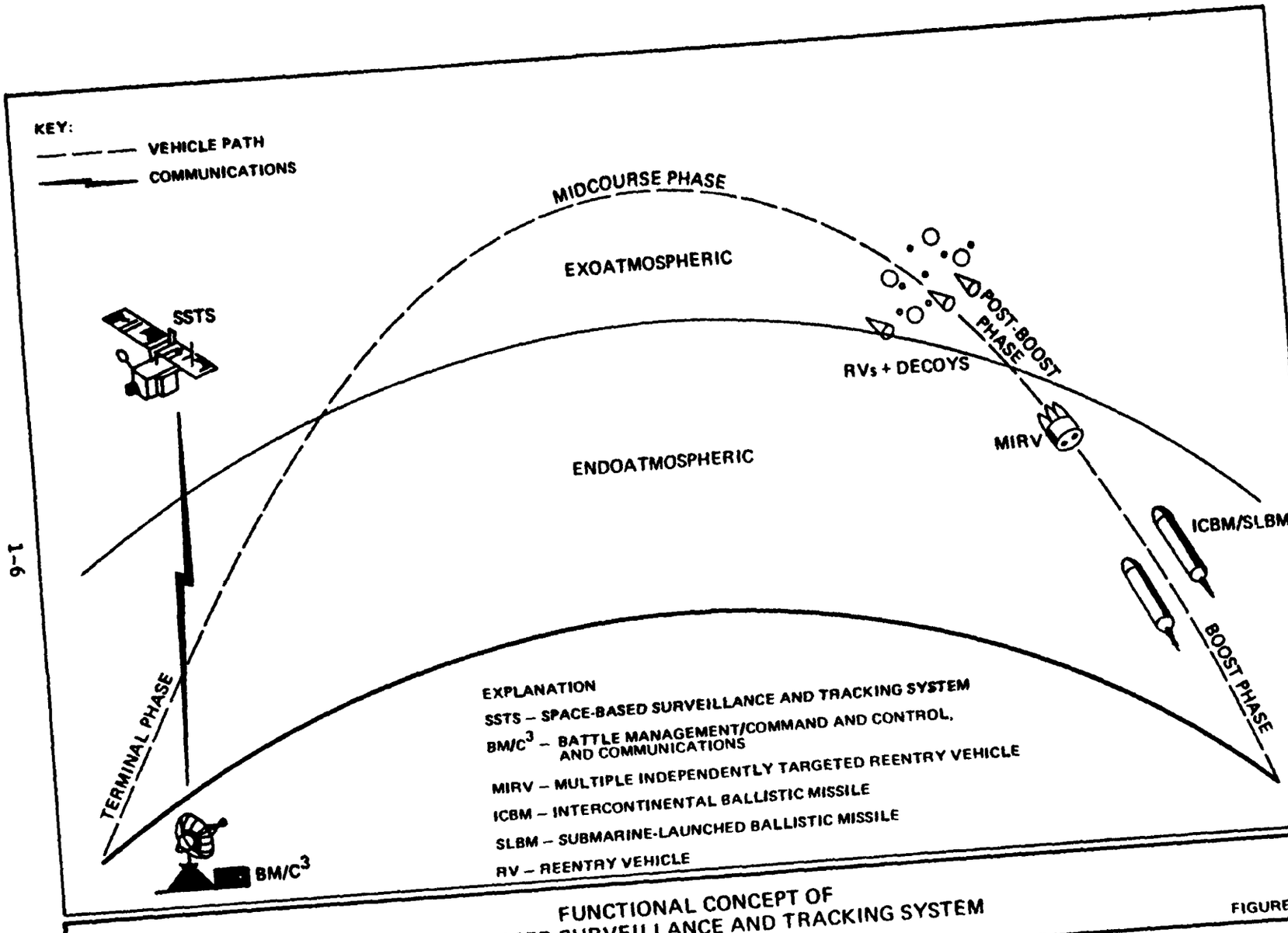
1.3 PROPOSED ACTION

The proposed action is the Demonstration/Validation program for the SSTS technology. This program would demonstrate whether the system can meet its specific performance requirements and provide the information necessary for the Defense Acquisition Board to recommend a Milestone II decision to proceed into Full-Scale Development.

Demonstration/Validation of the SSTS would require fabrication and ground testing of a limited capability SSTS satellite. The satellite would be launched into space for an on-orbit evaluation. Fabrication and ground testing would take place in existing or planned contractor and government facilities. The on-orbit evaluation could utilize modified launch facilities depending on the launch vehicle/launch location option chosen.

To date, Concept Exploration activities for SSTS have included detailed assessments of mission requirements, state-of-the-art technology, and technology and development risks that have been performed as part of the SSTS Mission Definition and Requirements Analysis program. However, additional simulation, component/assembly testing, and flight testing are required in Demonstration/Validation to address the following technological issues:

- Telescope Optics: Verify that the distortions associated with large optical elements satisfy detection and tracking requirements; verify that the optical materials performance will not degrade in a nuclear or space environment; verify that contamination buildup will not degrade element performance; verify that off-axis sources can be rejected by the baffle assembly.



FUNCTIONAL CONCEPT OF
SPACE-BASED SURVEILLANCE AND TRACKING SYSTEM

FIGURE 1-2

- o Focal Plane Arrays: Verify that a focal plane array can be constructed with adequate uniformity; verify that the array elements can be read quickly enough to satisfy detector and tracking requirements; verify that focal plane performance will not degrade in a nuclear or space environment; verify that crosstalk in element leads will not degrade performance; verify that contamination build-up problems can be resolved.

- o Cryocoolers: Verify that the cryocooler can maintain the required operating temperature in the space environment; establish power requirements; demonstrate acceptable time between failures; verify that cryocooler performance is not degraded in a nuclear or space environment.

- o Processor: Verify that algorithms can detect and track representative targets against characteristic background; verify that processor performance will not degrade in a space or nuclear environment; verify that the processor can operate correctly when faced with common fault conditions; verify that the data processing capability of the processor can meet requirements.

The Demonstration/Validation testing activities for the SSTS program are divided into analyses, simulations, component/assembly tests, and flight tests. Each of these categories and the subcategories specific to SSTS is described in greater detail in Appendix A. The SSTS test activities and their locations for these categories are summarized in Table 1-1. The following paragraphs provide additional descriptions of the test activities where appropriate. Figure 1-3 presents the locations of the test facilities.

1.3.1 Analyses

This category primarily applies to pre-hardware and pre-simulation activities. Analyses of platform survivability would examine the ability of the SSTS to withstand a hostile threat and continue functioning during attack. Analyses would include identification of threat environments and platform characteristics, including defenses necessary to survive. The evaluation would be completed at a contractor facility. Analysis and storage of flight test data at the completion of flight testing would be conducted at the National Test Facility.

1.3.2 Simulations and Component/Assembly Tests

Simulations create a digital representation of the physical world using specially developed computer software. Each simulation assigns a specific value to each physical parameter in the simulated system; these values are changed in subsequent simulations to determine: (1) how each parameter affects the simulated system and, (2) the optimal value for each parameter for maximum system efficiency.

The objective of component/assembly testing is to control some particular aspect of the physical environment of a hardware component being developed.

TABLE 1-1.
DEMONSTRATION/VALIDATION TESTING FOR
SPACED-BASED SURVEILLANCE AND TRACKING SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES				LOCATIONS[1]
	Analyses	Simulations	Component/ Assembly	Flight	
Ability of SSTS platform to withstand a hostile threat	X				Contractor facility[2]
Determine the ability of the platform attitude control system to maintain specified attitude		X	Space Chamber		Contractor facility[2]
		X	Space Chamber		Arnold Engineering Development Center[3]
Telescope optics/focal plane array performance evaluation		X	Scene Generator, Space Chamber		Contractor facility[2]
		X	Scene Generator, Space Chamber		Arnold Engineering Development Center[3]

(1) Adequate facilities exist unless otherwise noted.

(2) The selected contractor will certify compliance with all Federal, State, and local environmental laws and regulations necessary for facility operations through the DoD procurement process.

(3) Facility construction or modification required (excluding minor modification).

(4) Vandenberg Air Force Base is the preferred launch site because it is easier to obtain polar orbit; either a Titan IV or the Space Shuttle could be the launch vehicle.

(5) Cape Canaveral Air Force Station and the Eastern Test Range may be utilized if Titan IV is the launch vehicle; Kennedy Space Center and the Eastern Test Range may be utilized if the Space Shuttle is the launch vehicle.

TABLE 1-1 (Continued).
DEMONSTRATION/VALIDATION TESTING FOR
SPACED-BASED SURVEILLANCE AND TRACKING SYSTEM

TEST ACTIVITIES	TEST TECHNIQUES				LOCATIONS[1]
	Analyses	Simulations	Component/ Assembly	Flight	
Develop and test ability of optic glass material to withstand nuclear and space environment			Broad-Spectrum Radiation		Nevada Test Site
Launch of a limited capability satellite to test performance against targets on non-threat trajectories				X	Vandenberg Air Force Base/Western Test Range[3,4]
				X	Cape Canaveral Air Force Station/Eastern Test Range[3,5]
				X	Kennedy Space Center[5]
Analysis and storage of data from flight tests	X	X			National Test Facility[3]

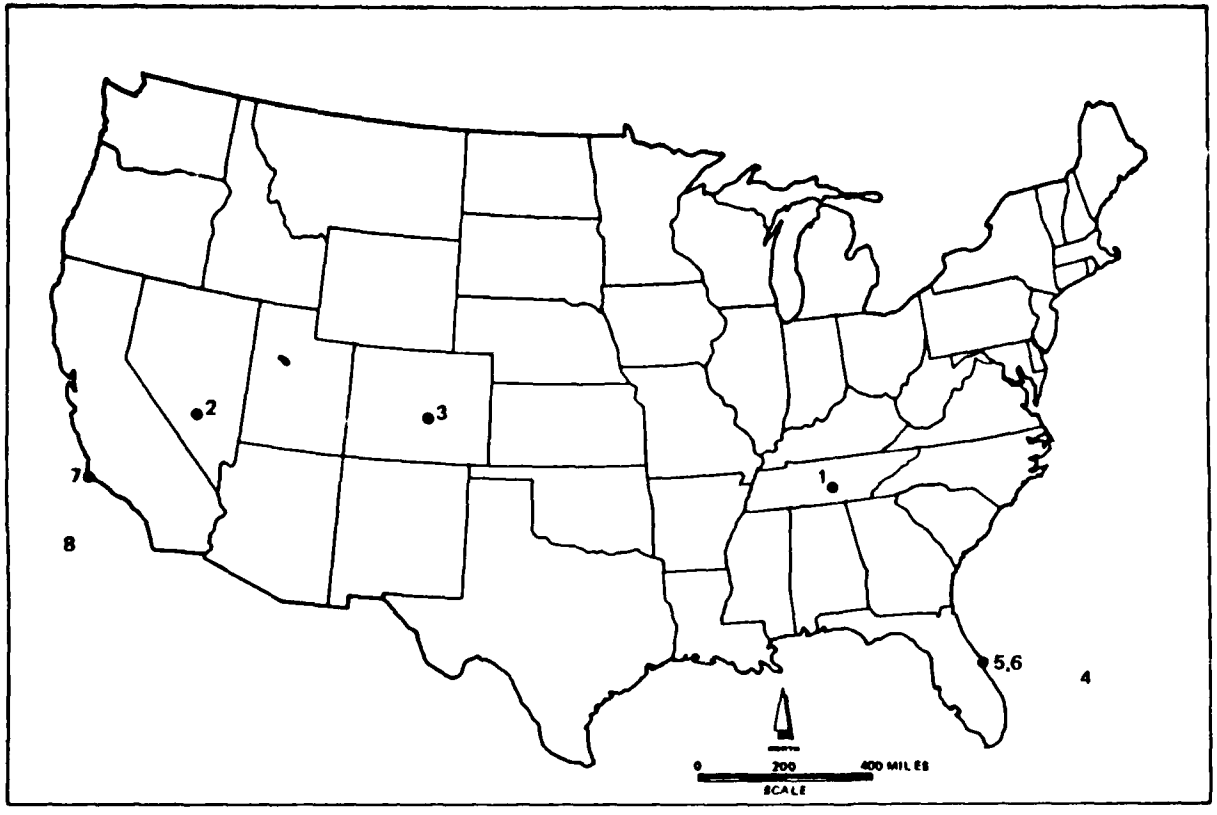
[1] Adequate facilities exist unless otherwise noted.

[2] The selected contractor will certify compliance with all Federal, State, and local environmental laws and regulations necessary for facility operations through the DoD procurement process.

[3] Facility construction or modification required (excluding minor modification).

[4] Vandenberg Air Force Base is the preferred launch site because it is easier to obtain polar orbit; either a Titan IV or the Space Shuttle could be the launch vehicle.

[5] Cape Canaveral Air Force Station and the Eastern Test Range may be utilized if Titan IV is the launch vehicle; Kennedy Space Center and the Eastern Test Range may be utilized if the Space Shuttle is the launch vehicle.



FACILITY

1. ARNOLD ENGINEERING DEVELOPMENT CENTER
2. NEVADA TEST SITE
3. NATIONAL TEST FACILITY
4. EASTERN TEST RANGE
5. CAPE CANAVERAL AIR FORCE STATION
6. KENNEDY SPACE CENTER
7. VANDENBERG AFB
8. WESTERN TEST RANGE

SPACE-BASED SURVEILLANCE AND TRACKING SYSTEM
DEMONSTRATION/VALIDATION FACILITIES

FIGURE 1-3

During the test, data are collected on the environment and the performance of the component. A chamber generally represents the environment; the response of the hardware component to the environment is recorded and analyzed.

Each aspect of the SSTS program that underwent simulation testing would also be subject to component/assembly testing. Unless otherwise specified, both types of testing would take place at contractor facilities.

Platform attitude control, including response of the platform to disturbances from thrusters or threat inputs in terms of vibration damping and thruster capabilities, would be examined in simulation modeling and possibly in a space chamber to be constructed at Arnold Engineering Development Center.

Telescope optics would be subject to simulations and chamber tests both during manufacture and as integrated with the focal plane array. This latter testing would take place at the new test chamber at the Arnold Engineering Development Center. An infrared scene generator using input information from other Strategic Defense Initiative program elements to provide target, background, and clutter models would be used in these integrated tests.

Space chamber tests would determine the ability of the telescope, focal plane array, signal processor, and cryocooler assembly to detect, interpret, and track reentry vehicles using a scene generator. Elements of the array would be tested at manufacturers' facilities, and would be subject to tests for materials performance, productivity yields, power requirements for temperature control, and mean time between failures.

Computer hardware and software would be subject to simulations and chamber tests separately for performance evaluations and in the integrated tests described previously for the optics and focal plane arrays.

Radiation testing of optical mirror samples (a total of three square feet of sample area) would be performed during underground nuclear tests at the Nevada Test Site. These exposures would take advantage of underground nuclear tests scheduled for other programs in September 1987 and March 1989.

SSTS flight test data would be used for simulations at the National Test Facility to analyze the results of the flight test.

1.3.3 Flight Tests

Flight tests are conducted within a missile range that generally consists of a launch area with launch pads or silos, associated control and support facilities, a surrounding safety area, and a controlled land/sea/air area for flight and impact.

The SSTS Demonstration/Validation tests would involve the orbiting of a flight-qualifiable satellite (a satellite capable of surviving the launch and functioning in a space environment). The final choices of the satellite launch site and booster have not been made. Both the Titan IV and the Space Shuttle are currently being considered to launch the SSTS Demonstration/Validation satellite. At present, both Cape Canaveral Air Force Station and Vandenberg Air Force Base are developing launch capabilities for the Titan IV. While the Space Shuttle could be launched from either Kennedy Space Center or

Vandenberg Air Force Base in the future, at present only Kennedy is qualified to launch this vehicle.

Vandenberg Air Force Base is the preferred launch site as it would be more desirable to place the satellite in a polar orbit, which would provide better utilization of the satellite for testing. A polar orbit is more difficult to achieve from Cape Canaveral and Kennedy Space Center because of the need to offset the launch path to avoid flying over the North and South American land masses during launch. A launch from Vandenberg would require the support of the Western Test Range. A launch from either Cape Canaveral or Kennedy Space Center would require support from the Eastern Test Range.

Performance would be tested against a small number of realistic targets on non-threat trajectories. It has not yet been specified whether these would be dedicated targets or targets of opportunity.

1.4 NO-ACTION ALTERNATIVE

The no-action alternative is to continue with Concept Exploration activities without progressing to the Demonstration/Validation stage at this time.

2. ENVIRONMENTAL SETTING

The test activities of the SSTS Demonstration/Validation program and the facilities where they would be conducted were identified in Table 1-1. Some of the tests would be conducted at contractor facilities that have not yet been identified. Tests would also be conducted at government facilities at Arnold Engineering Development Center, Nevada Test Site, Vandenberg Air Force Base/Western Test Range, Cape Canaveral Air Force Station/Eastern Test Range, Kennedy Space Center, and the National Test Facility. This section describes the environmental setting of each government facility in terms of physical and operational characteristics, permit status, and previous environmental documentation. Specific physical characteristics include facility size, base and test facilities, and environmental conditions. Operational characteristics include the socioeconomic parameters of staffing, payroll, and housing, and the infrastructure characteristics of electricity, solid waste, sewage treatment, transportation, and water supply.

Permits described are those that relate to air quality, wastewater, and hazardous waste. Previous environmental documentation includes environmental compliance plans, base master plans, environmental assessments and environmental impact statements. The socioeconomic characteristics of the counties and communities surrounding the facility are also presented.

The data for each planned test facility are presented in tables and figures. The level of detail in these tables reflects the availability of pertinent program and facility information.

Many of the tests for the SSTS Demonstration/Validation program would be completed in contractor facilities that have not been identified. The contractor facilities are commercial/industrial operations and are required to certify compliance with all Federal, State, and local permits and authorizations necessary for facility operation, modification, and construction as part of the conditions of the contract.

If the procurement process required a selected contractor to use federal funds to conduct an activity with a potential for significant environmental consequences, an environmental analysis of the consequences of such activities would also be required of the contractor. That analysis would be utilized by DoD in completing an environmental assessment or environmental impact statement, as appropriate.

The methodology used in developing the descriptions of the government facilities that would be used in the program involved identifying and acquiring available literature, such as environmental assessments, environmental impact statements, and base master plans. The literature was reviewed and data gaps (i.e., questions that could not be answered from the literature) were identified. To fill the data gaps, facility personnel were interviewed by telephone. Where this report utilizes information collected through telephone interviews, appropriate references are presented in the List of References, Section 6; primary contacts for each facility are listed in Section 5. The following subsections describe the environmental setting of each of the government facilities where Demonstration/Validation activities are planned.

Ten areas of environmental consideration are addressed: (1) air quality; (2) water quality; (3) biological resources; (4) infrastructure: electricity, solid waste, sewage treatment, water supply, transportation; (5) hazardous waste; (6) land use; (7) visual resources; (8) cultural resources; (9) noise; and (10) socioeconomics.

Several of the resource areas, specifically air and water quality, are regulated by federally mandated standards. The treatment, storage, and disposal of hazardous wastes are also regulated by Federal standards. Where federally mandated standards do not exist, qualitative evaluations were made. A discussion of each resource area is provided below.

Air Quality

Air quality concerns at each facility were evaluated in terms of the National Ambient Air Quality Standards and the location of facility in an attainment or nonattainment area. For existing air emissions sources the facility was evaluated based on the emission standards contained in the associated State Implementation Plan. Possible air emissions sources, such as expansion of facilities and new construction, were evaluated using the New Source Review requirements.

Water Quality

Water quality concerns at each location were identified and the facility's record of compliance with permits is presented.

Biological Resources

The Endangered Species Act protects plants and animals threatened with extinction. A review of the environmental documentation of the geographic area surrounding the facility was conducted to determine the documented presence of threatened and endangered species.

Infrastructure

Electricity, solid waste, sewage treatment, water supply, and transportation are infrastructure requirements that ultimately limit the capacity for growth. Capacity and current demand are described for each facility.

Hazardous Waste

The Resource Conservation Recovery Act regulates how a facility can dispose of its hazardous waste. The record of compliance was reviewed to determine the facility's capability to handle any additional wastes and to determine any potential disposal problems.

Land Use

Base master plans, environmental management plans, and other documentation were reviewed to determine any current conflicts between the facility and local standards, and to evaluate the probability of conflict resulting from any planned expansions.

Visual Resources

Existing environmental documentation was reviewed to determine if aesthetic concerns were an issue at any of the facilities.

Cultural Resources

Existing environmental documentation was reviewed to determine if any significant cultural resources in proximity to the facilities would be affected by test activities.

Noise

Existing environmental documentation was reviewed to determine if noise concerns were an issue at any of the facilities.

Socioeconomics

Key socioeconomic indicators (population, housing, employment, and income data) for the supporting region of each facility were examined to evaluate the potential consequences of increased population, expenditures, and employment.

2.1 ARNOLD ENGINEERING DEVELOPMENT CENTER

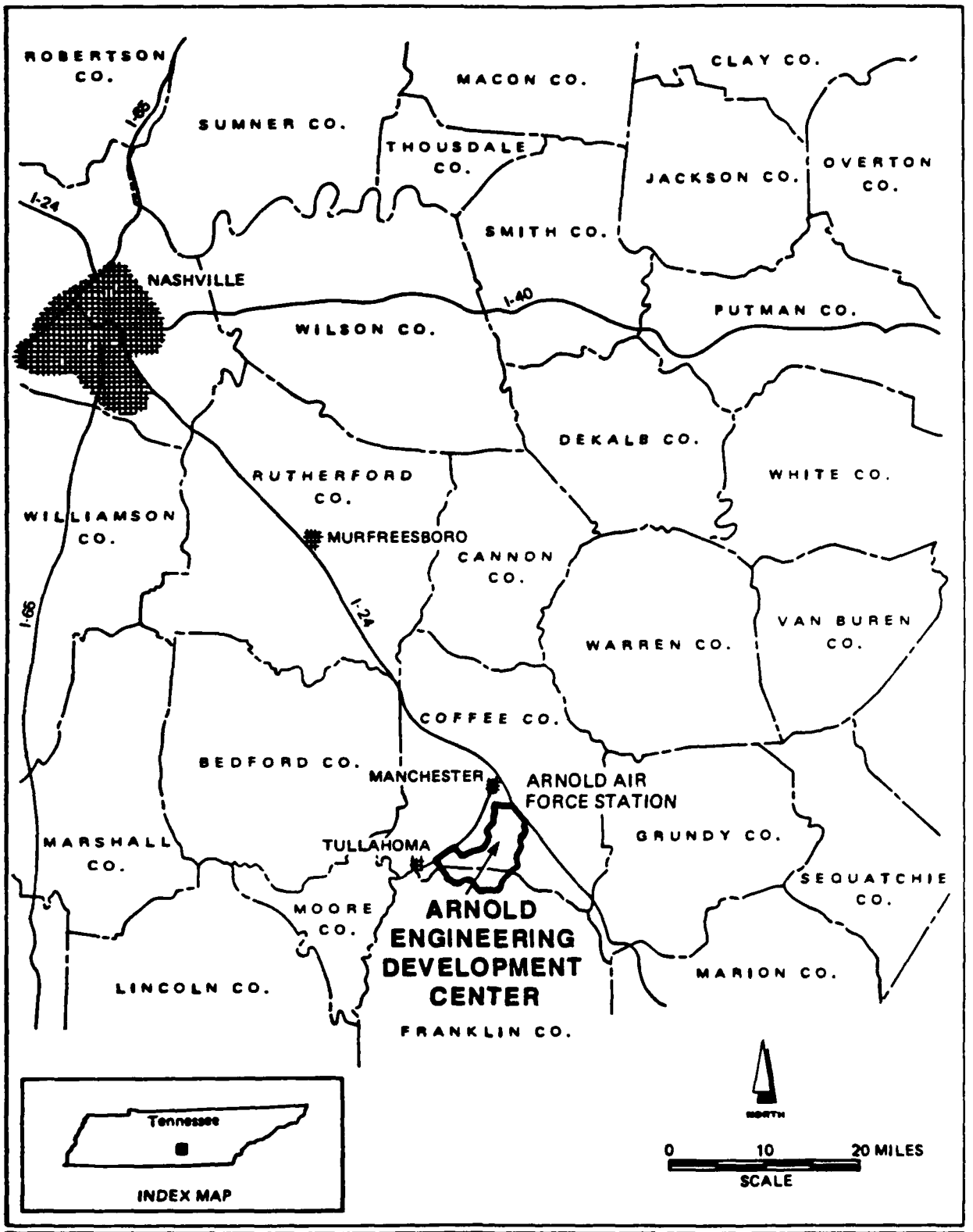
Arnold Engineering Development Center is located at Arnold Air Force Station approximately 7 miles southeast of Manchester, Tennessee (Figure 2-1). Arnold Engineering Development Center is the nation's largest complex of wind tunnels, jet and rocket engine test cells, space simulation chambers, and hyper-ballistic ranges (51). Wind tunnels at Arnold Engineering Development Center are routinely used to test missile components and assemblies in an environment that simulates actual high-speed flight. A description of the Arnold Engineering Development Center and its environment is presented in Table 2-1.

For socioeconomic purposes, the supporting region for Arnold Engineering Development Center is defined as Coffee and Franklin Counties, and the nearby communities of Manchester and Tullahoma. Selected socioeconomic data for these areas are presented in Table 2-2.

Based on available data, Arnold Engineering Development Center is in compliance with Federal standards for air quality, water quality, and hazardous waste (4, 10, 18). Environmental consequences of facility operation will be addressed in an ongoing revision of an existing environmental assessment ("Formal Environmental Assessment for Arnold Engineering Development Center Operations," February 1977) (4).

2.2 NEVADA TEST SITE

The Nevada Test Site is located adjacent to the Nellis Air Force Range approximately 65 miles northwest of Las Vegas in southeastern Nye County, Nevada (Figure 2-2) (67). The Nevada Test Site, 864,000 acres in size, operates facilities for underground testing of nuclear devices and weapons



LOCATION MAP OF ARNOLD ENGINEERING DEVELOPMENT CENTER AT ARNOLD AIR FORCE STATION, TENNESSEE

FIGURE 2-1

TABLE 2-1
SELECTED ENVIRONMENTAL CHARACTERISTICS
ARNOLD ENGINEERING DEVELOPMENT CENTER

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	39,081 acres (Arnold AFS); main laboratory is a 3,000-acre fenced compound.	17, 55
		BASE FACILITIES	3,000 acre fenced main laboratory area, 6,000-foot airstrip, test and administration buildings, recreation areas, 4,000 acre Wood's Reservoir	55
		TEST FACILITIES	40 aerodynamic and propulsion wind tunnels, 11 rocket and turbine engine test cells, 4 ballistic and impact ranges, 2 arc heaters and 4 space environment chambers	51
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Wood cutting permits are sold to general public for cutting firewood in designated areas. The Wildlife Management Program restocks fish in Wood's Reservoir. Recreational facilities for Air Station personnel and general public available at Reservoir. 1,400 acres are under sharecropper permits with local farmers.	17, 51
		VISUAL RESOURCES	The Air Force Station is located within a rural area characterized by gentle hills, 30,000 acres of hardwood forest, and the 4,000-acre Wood's Reservoir. The research area is screened by pine forest along the access road.	17, 55
		SPECIAL STATUS	Federally listed endangered species: Gray Bat, Indiana Bat, Red-Cockaded Woodpecker. There are two designated wetland areas, no designated historical or archaeological sites.	13, 17, 55
		NOISE	Work at Arnold Engineering Development Center creates noise in excess of safety levels within the test areas. The noise problems are minimized by a 6,000-acre dense pine plantation around AEDC, the location of the site 5 miles from the nearest town, selective scheduling of operations, and mufflers for facility exhausts.	4, 17, 50, 55
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Civilian = 307, Military = 163, Contractor = 3,779 (1986)	2
		PAYROLL	Air Force = $16.0 million; Contractor = $232 million (1986)	2
		HOUSING	Officer = 24, NCO = 16, Transient = 47 (1986)	2

TABLE 2-1 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
ARNOLD ENGINEERING DEVELOPMENT CENTER

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Daily consumption = 250,000 kWh, Daily capacity = 600,000 kWh; supplied by the Tennessee Valley Authority	27
		SOLID WASTE	One landfill on base, contracted to the city of Tullahoma, will reach capacity by December 1987. Future disposal sites to be determined by contractor.	27
		SEWAGE TREATMENT	Design capacity for main plant = 2.89 million gallons/day Current use = 0.21 million gallons/day	3
		TRANS-PORTATION	Interstate 24 and other Federal and State highways provide access to the site. Traffic has been no problem.	17, 40
		WATER SUPPLY	Demand = 1.07 million gallons/day Capacity = 2.75 million gallons/day	3
PERMIT STATUS		AIR	27 current PSD permits; the ambient air quality of the area is within attainment of air quality standards.	4, 17
		WASTE WATER	Eight current NPDES permits; one violation in December 1986 for excessive infiltration.	4, 10
		HAZARDOUS WASTE	A TSD facility; total hazardous waste generated 119,000 pounds; submitted RCRA Part B in August 1985 and is awaiting public notification. Minor corrective actions will be required for prior, non-groundwater contaminating releases.	4, 19
ADDITIONAL ENVIRONMENTAL INFORMATION			Environmental Compliance Plan currently under development; Base Master Plan currently under revision; Existing EA; formal EA for AEDC Operations, revision of February 1977, currently undergoing another revision; EA for Elk Resource Recovery Facility, AEDC; 1984 Environmental Quality Program, Arnold AFS; Environmental Statement, National Guard Use of AEDC, April 1972; Environmental Impact on Noise from the Proposed AEDC High Reynolds Number Tunnel, March 1973.	4, 17, 50, 55
COMMENTS			Test Facility for SSTS is still in the design phase; the environmental group at Arnold has been tasked with writing the required EA.	11

TABLE 2-2.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
ARNOLD ENGINEERING DEVELOPMENT CENTER

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Coffee County					
Population	32,572	38,311	40,126	1.64	1.16
Year-Round Housing	11,104	14,967	N/A	3.03	N/A
Vacancy Rate (%)	8.4	8.8	N/A	--	--
Civilian Labor Force	12,685	17,703	21,163	3.39	4.56
Unemployment (%)	4.5	6.8	8.7	--	--
Per Capita Income ($)[1]	2,479	6,153	8,027	--	--
Median Family Income ($)[1]	7,668	16,516	N/A	--	--
Franklin County					
Population	27,289	31,983	33,123	1.60	0.88
Year-Round Housing	8,767	11,570	N/A	2.81	N/A
Vacancy Rate (%)	6.8	6.7	N/A	--	--
Civilian Labor Force	10,390	13,790	12,956	2.87	-1.55
Unemployment (%)	5.3	9.3	10.9	--	--
Per Capita Income ($)[1]	2,108	5,544	7,106	--	--
Median Family Income ($)[1]	6,599	15,576	N/A	--	--
Manchester					
Population	6,810	7,250	7,445	0.63	0.67
Year-Round Housing	2,175[2]	2,954[2]	N/A	3.11[2]	N/A
Vacancy Rate (%)	N/A	9.7[2]	N/A	--	--
Civilian Labor Force	N/A	N/A	N/A	N/A	N/A
Unemployment (%)	N/A	N/A	N/A	--	--
Per Capita Income ($)[1]	N/A	6,685	8,837	--	--
Median Family Income ($)[1]	N/A	15,260	N/A	--	--

References: 43, 44, 45, 46

[1] Income figures refer to preceding year

[2] "Total Housing Units"

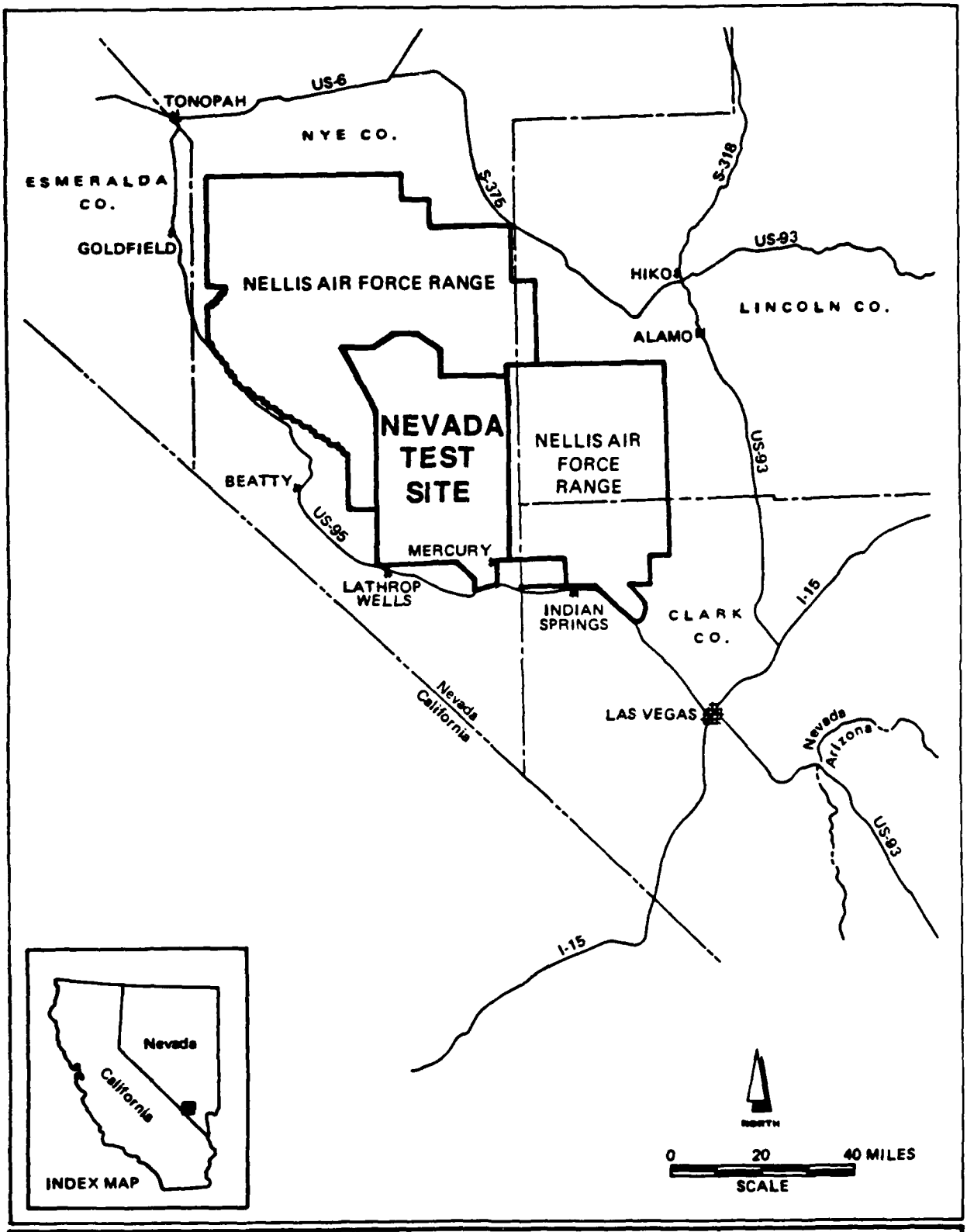
TABLE 2-2 (Continued).
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
ARNOLD ENGINEERING DEVELOPMENT CENTER

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Tullahoma					
Population	15,311	15,800	16,535	0.31	1.14
Year-Round Housing	5,223[2]	6,236[2]	N/A	1.79[2]	N/A
Vacancy Rate (%)	N/A	7.2[2]	N/A	--	--
Civilian Labor Force	N/A	N/A	N/A	N/A	N/A
Unemployment (%)	N/A	N/A	N/A	--	--
Per Capita Income($)[1]	N/A	6,691	8,650	--	--
Median Family Income ($)[1]	N/A	15,292	N/A	--	--

References: 43, 44, 45, 46

[1] Income figures refer to preceding year

[2] "Total Housing Units"



LOCATION MAP OF NEVADA TEST SITE, NEVADA

FIGURE 2-2

testing. Exposure of materials and components to nuclear radiation is often an integral part of a nuclear test. A description of the facility and its environment is presented in Table 2-3.

For purposes of socioeconomic assessment, the supporting region for the Nevada Test Site is defined as Nye County, where the facility itself is located, as well as Clark County and its main population center, Las Vegas, located to the southeast. Selected socioeconomic data for these areas are presented in Table 2-4.

Based on available data, the Nevada Test Site is in compliance with Federal standards for air quality, water quality, and hazardous waste (48, 67). Environmental documentation has been prepared for the Nevada Test Site (Final Environmental Impact Statement, ERDA-155, September 1977) (14).

2.3 VANDENBERG AIR FORCE BASE/WESTERN TEST RANGE

Vandenberg Air Force Base is located on the coast of California 55 miles north of Santa Barbara (Figure 2-3). Vandenberg Air Force Base is the third largest air base in the United States and occupies 98,400 acres along 35 miles of Pacific coastline within Santa Barbara County. It is the Strategic Air Command's pioneer missile base and the headquarters of the 1st Strategic Aerospace Division and the Space Missile Test Organization (59). Facilities house DoD, government, and civilian contractors, and provide the necessary support for missile test launches. A description of the facility and its environment is presented in Table 2-5.

Existing launch facilities are scheduled to test launch intercontinental ballistic missiles, including the Minuteman, Peacekeeper, Atlas, and Scout (33). Launch facilities for the Space Shuttle are not operational, but are being developed. Current plans are to refurbish the Titan Complex 4E for launches of Titan IV or construct a new facility (6). The refurbished facility is due to be operational around 1990 (6).

The Western Test Range includes a broad area of the Pacific Ocean which extends offshore from Vandenberg Air Force Base on the coast of California (Figure 2-4) to the Indian Ocean. The range functions as the test area for space and missile operations. It includes a network of tracking and data gathering facilities throughout California, Hawaii, and the South Pacific, supplemented by instrumentation on aircraft (41). Launch and spacecraft operations are monitored and supported by the Air Force Satellite Control Facility, the Consolidated Space Operations Center, and the MILSTAR Satellite Communication system.

For socioeconomic purposes, the supporting region for Vandenberg Air Force Base is defined as the surrounding Santa Barbara County, and the nearby communities of Lompoc and Santa Maria. Selected socioeconomic data for these areas are presented in Table 2-6.

Based on available data, Vandenberg Air Force Base is in compliance with all Federal standards for air quality, water quality, and hazardous waste. However, water is supplied by onbase wells from two aquifers which are currently being overdrawn (53).

TABLE 2-3
SELECTED ENVIRONMENTAL CHARACTERISTICS
NEVADA TEST SITE

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	864,000 acres	67
		BASE FACILITIES	Dedicated to underground nuclear testing, development and testing of nuclear explosives for peaceful applications, and testing of weapons effects	21, 49
		TEST FACILITIES	Facilities for underground testing of nuclear devices and exposure of components to nuclear radiation	49, 67
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Low-grade uranium and geothermal resources are found in general area, but are not currently considered economical.	49
		VISUAL RESOURCES	Located in a desert area with gently rolling topography dissected by ephemeral streams; landscape has been affected by underground blasting.	49
		SPECIAL STATUS	No federally listed threatened or endangered species listed; however, there are several candidate species. Archaeological and historical sites have been identified, but none are listed on the National Register of Historical Places.	14, 48, 49
		NOISE	Uninhabited desert, intermittent short duration noise from onsite tests	14
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Approximately 8,000, mostly civilians	67
		PAYROLL	Data not available	
		HOUSING	Limited housing onsite	67

TABLE 2-3 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
NEVADA TEST SITE

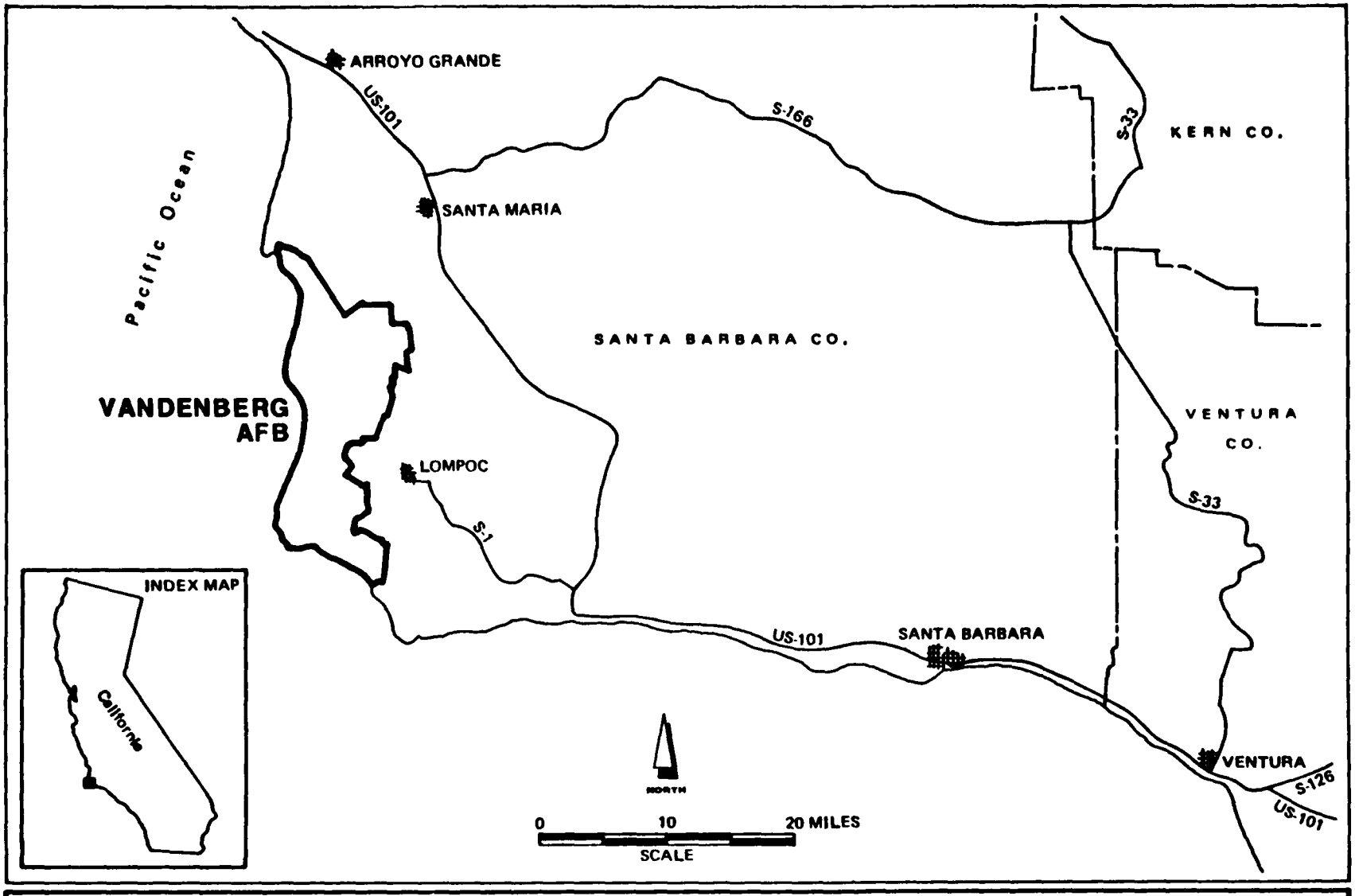
				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Peak daily load = 37 MW; will need to upgrade capacity in the next 4-5 years	68
		SOLID WASTE	Permitted disposal onsite	68
		SEWAGE TREATMENT	Currently three ponds in use	68
		TRANS-PORTATION	700 miles of road onsite, 300 miles are paved. Funding for upgrading is available. Network is within capacity.	68
		WATER SUPPLY	Demand = 1.2 million gallons/day; capacity = 2.4 million gallons/day; supplied by 17 onsite wells.	48
PERMIT STATUS		AIR	Within attainment of all National Ambient Air Quality Standards	48
		WASTE WATER	No release of effluent to streams; no permits	48, 67
		HAZARDOUS WASTE	TSD facility with RCRA Part B permit to handle new wastes	48
ADDITIONAL ENVIRONMENTAL INFORMATION	Final Environmental Impact Statement, Nuclear Test Site, FRDA-155, September 1977			14
COMMENTS	Underground testing is conducted in the Pahute Mesa, Ranier Mesa, Yucca Flat, and Frenchman Flat areas of Nevada Test Site.			14

TABLE 2-4.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
NEVADA TEST SITE

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Nye County					
Population	5,599	9,048	14,434	4.92	12.39
Year-Round Housing	2,093	4,202	N/A	7.22	N/A
Vacancy Rate (%)	13.4	18.3	N/A	--	--
Civilian Labor Force	2,465	4,330	3,659	5.80	-4.12
Unemployment (%)	2.8	4.7	6.3	--	--
Per Capita Income ($)[1]	3,844	7,169	8,889	--	--
Median Family Income ($)[1]	10,218	19,914	N/A	--	--
Clark County					
Population	273,288	463,087	536,473	5.42	3.75
Year-Round Housing	92,815	189,860	N/A	7.42	N/A
Vacancy Rate (%)	5.5	8.4	N/A	--	--
Civilian Labor Force	113,669	240,320	279,180	7.77	3.82
Unemployment (%)	5.2	6.4	8.6	--	--
Per Capita Income ($)[1]	3,538	8,259	9,930	--	--
Median Family Income ($)[1]	10,865	21,029	N/A	--	--
Las Vegas					
Population	125,787	164,674	183,227	2.73	2.70
Year-Round Housing	43,028	67,041	N/A	4.53	N/A
Vacancy Rate (%)	5.0	7.3	N/A	--	--
Civilian Labor Force	54,500	86,114	100,136	4.68	3.84
Unemployment (%)	5.6	6.7	9.0	--	--
Per Capita Income ($)[1]	3,614	8,135	9,795	--	--
Median Family Income ($)[1]	11,338	21,028	N/A	--	--

References: 43, 44, 45, 47

[1] Income figures refer to preceding year



LOCATION MAP OF VANDENBERG AFB, CALIFORNIA

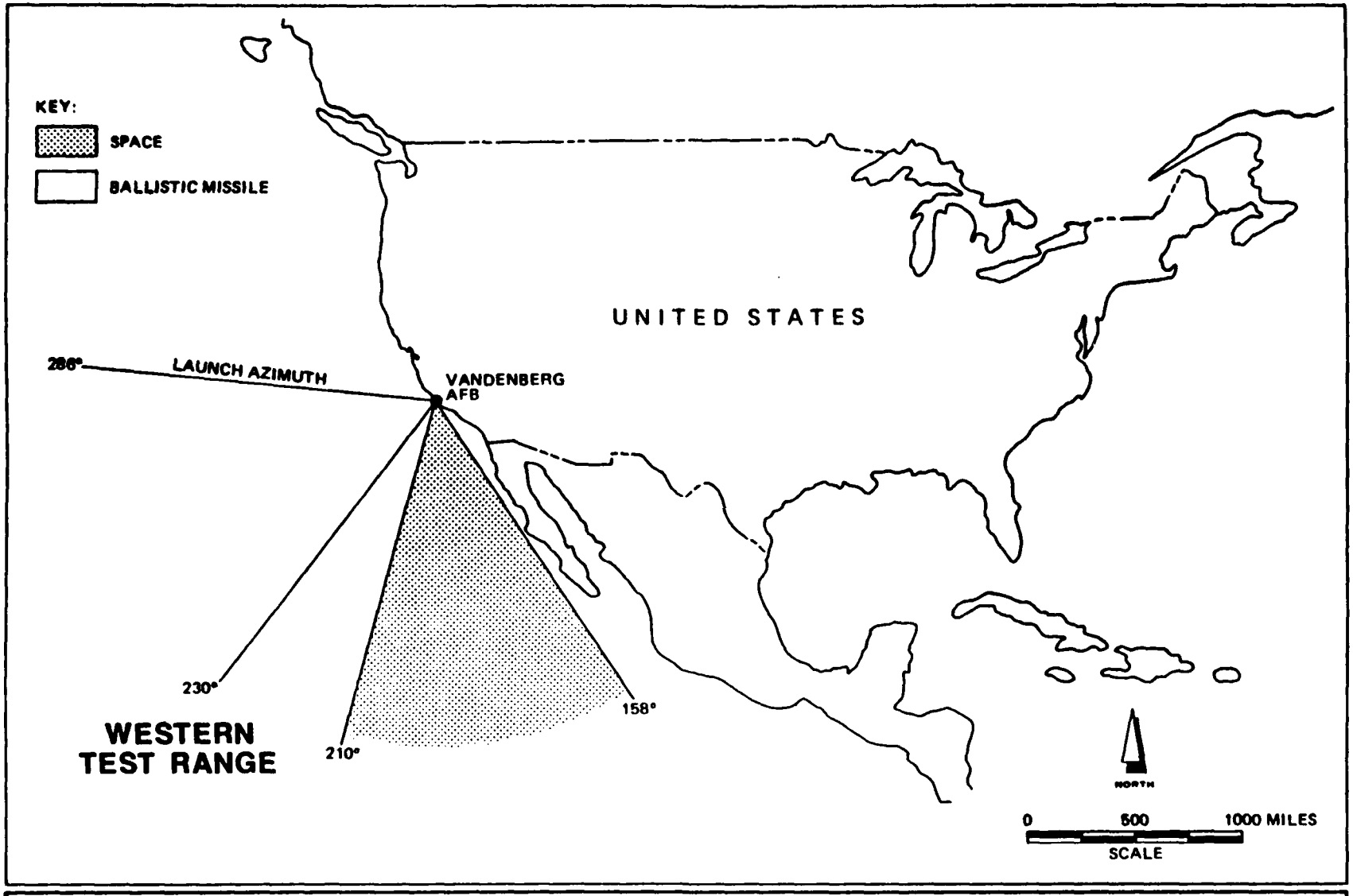
FIGURE 2-3

TABLE 2-5
SELECTED ENVIRONMENTAL CHARACTERISTICS
VANDENBERG AIR FORCE BASE

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	98,400 acres	1
		BASE FACILITIES	45-bed hospital, 6 onbase electrical power plants, 6,000-acre cantonment area, 35 missile launch sites, 15,000-foot runway	1, 53
		TEST FACILITIES	Missile assembly buildings, missile launch pads, missile control building, tracking stations	53
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Proven onbase oil and gas reserves	53
		VISUAL RESOURCES	North Vandenberg is characterized by natural landforms consisting of rolling hills interrupted by canyons and valleys. The central cantonment area consists of residential, administrative, and industrial structures. The inland portion of south Vandenberg landscape varies from gently rolling hills to steep, sloping terrain. The coastal portion of north and south Vandenberg includes steep bluffs and canyons, rocky shorelines and promontories, beaches, river outlets, and sand dunes.	53
		SPECIAL STATUS	Over 600 known cultural resources exist on base, most of which are archaeological sites. Two sites listed on National Register of Historical Places. Federally listed endangered species include: California Brown Pelican, California Least Tern, Least Bell's Vireo, American Peregrine Falcon, and Unarmored Threespine Stickleback. Threatened species include the Southern Sea Otter and the Guadalupe Fur Seal. There are no federally listed endangered or threatened plants. 5,125 acres are designated by the U.S. Fish and Wildlife Service as wetlands. The Base also contains 35 miles of coastline, 166 miles of streams, 9,000 acres of dune habitat, and 4,200 acres of woodland.	53
		NOISE	North Vandenberg area affected by missile launches, maintenance activities, and traffic. Noise levels in cantonment area typical of residential area. South Vandenberg affected by launch facilities, traffic, and the Southern Pacific Railroad. Noise monitoring network onbase. Measured noise levels in vicinity of launch facilities range from L_{dn} 44 to L_{dn} 69, with maximum L_{dn} 120.	53
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Military = 3,971 Civilian = 1,487 Contractor = 7,913 (1987)	18
		PAYROLL	Military and civilian $157 million; contractors $244 million (1987)	18
		HOUSING	Officers = 511; NCO = 1,567; Transient = 400; 172 mobile trailer spaces, (1987)	18

TABLE 2-5 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
VANDENBERG AIR FORCE BASE

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Peak daily demand = 558,900 kWh; peak daily capacity = 580,000 kWh; supplied by PG&E power grid.	16, 35
		SOLID WASTE	Volume = 25,000 tons/year, capacity = 95,000 tons/year; disposed at five offsite facilities by private contractor. Three of five facilities expected to have adequate space to year 2000.	15, 53
		SEWAGE TREATMENT	Design capacity of offsite facility (serving the city of Lompoc, unincorporated areas surrounding Lompoc, and Vandenberg) is 5 million gallons/day. Onsite system treats waste from cantonment area with a capacity of 3 million gallons/day. Total sewage produced in 1986 by Vandenberg AFB was approximately 1 million gallons/day.	15, 53, 57
		TRANS-PORTATION	Road network on base has considerable excess capacity. Road network leading to base near or at capacity. Access to launch sites restricted several hours prior to launch.	35, 53
		WATER SUPPLY	10 potable wells on base supply all Vandenberg's water needs. 1,497 million gallons produced in 1986. Potable water wells and an additional 24 monitoring wells are regularly sampled. All have acceptable water quality, except for two wells in the Santa Ynez field which show excessive chromium and pesticide levels.	15, 53
PERMIT STATUS		AIR	Permits in place authorize onbase construction and operations from the Air Pollution Control District. North county portion of Santa Barbara County, which contains Vandenberg, is currently in attainment of air quality standards. Three PSD monitoring stations onbase.	28, 42
		WASTE WATER	NPDES permits in place for 15 onbase sewage discharge locations	34
		HAZARDOUS WASTE	Approximately 500 tons generated per year; disposed at offsite facility by private contractor. Vandenberg has a short-term hazardous waste storage permit.	28
ADDITIONAL ENVIRONMENTAL INFORMATION			Recent (1987) Draft EIS on oil and gas exploration at Vandenberg. Existing EIS documents (1983, 1978) for MX missile and space shuttle launches from Vandenberg. EIS in progress for Titan IV launch facilities and operations.	5, 53, 57, 58, 62
COMMENTS			Missile launches have relatively little impact on air quality. Many base operations and programs were restricted in anticipation of Space Shuttle launches. Since the program has been suspended, the large amounts of offset allow for more potential emissions.	42



LOCATION MAP OF WESTERN TEST RANGE

FIGURE 2-4

TABLE 2-6.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
VANDENBERG AIR FORCE BASE

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Santa Barbara County					
Population	264,324	298,694	322,781	1.23	1.96
Year-Round Housing	88,777	114,720	123,476[2]	2.60	1.48[3]
Vacancy Rate (%)	5.5	4.7	3.64[2]	--	--
Civilian Labor Force	101,425	145,949	167,921	3.71	3.57
Unemployment (%)	6.4	5.8	5.9	--	--
Per Capita Income [1]	3,357	8,406	11,125	--	--
Median Family Income [1]	10,451	21,630	N/A	--	--
Lompoc					
Population	25,280	26,267	29,342	0.38	2.81
Year-Round Housing	7,991	9,870	N/A	2.13	N/A
Vacancy Rate (%)	5.5	5.0	N/A	--	--
Civilian Labor Force	8,727	11,366	13,083	2.68	3.58
Unemployment (%)	9.6	9.3	9.4	--	--
Per Capita Income [1]	2,839	6,828	9,492	--	--
Median Family Income [1]	9,636	19,272	N/A	--	--
Santa Maria					
Population	32,749	39,685	46,494	1.94	4.04
Year-Round Housing	10,803	15,007	N/A	3.34	N/A
Vacancy Rate (%)	5.5	6.4	N/A	--	--
Civilian Labor Force	13,269	18,678	21,500	3.48	3.58
Unemployment (%)	8.1	9.4	9.5	--	--
Per Capita Income [1]	3,116	6,507	8,682	--	--
Median Family Income [1]	9,902	18,526	N/A	--	--

References: 43, 44, 45, 47

[1] Income figures refer to preceding year

[2] 1985 data

[3] 1980-1985 annual % change

Recent environmental documents include: "Draft Environmental Impact Statement, Potential Exploration, Development, and Production of Oil and Gas Resources," April 1987 (53), and "Environmental Assessment for Repair and Restoration of Space Launch Complex 4," June 1987 (61). The "Space Shuttle Environmental Impact Statement," 1978 (58), addresses Shuttle launches from Vandenberg Air Force Base (35). Impacts from MX launches are addressed in the "MX Milestone II Final Environmental Impact Statement," 1978 (35, 57). An environmental impact statement is in progress for the refurbished facility for Titan IV launches (35).

2.4 CAPE CANAVERAL AIR FORCE STATION/EASTERN TEST RANGE

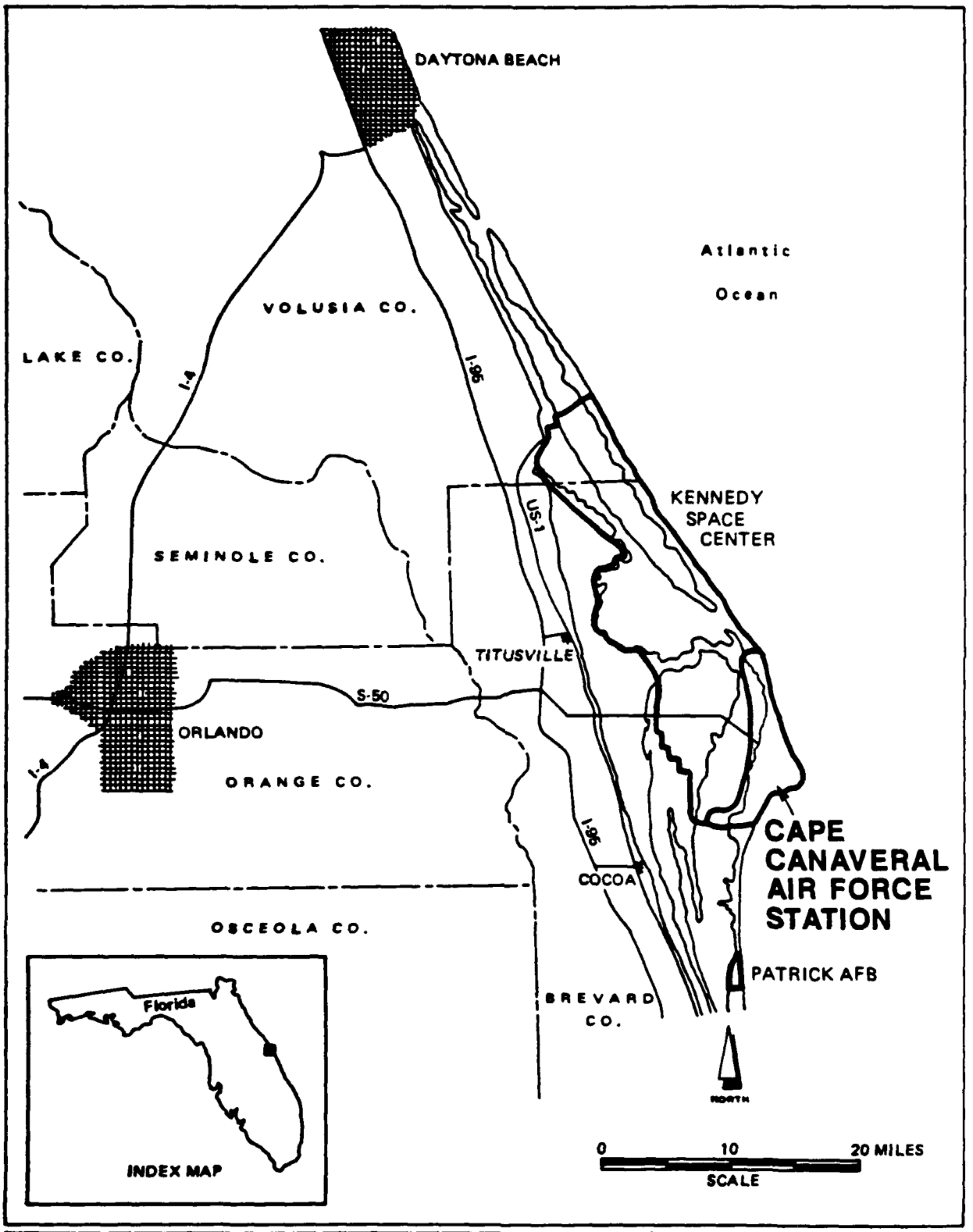
The Eastern Space and Missile Center is the host organization for Cape Canaveral Air Force Station/Eastern Test Range, as well as Patrick Air Force Base and the Eastern Test Range. Cape Canaveral Air Force Station and Patrick Air Force Base are located between the Banana River and the Atlantic Ocean in Brevard County on Florida's east coast (Figure 2-5), approximately 20 miles southeast of Titusville. Patrick Air Force Base is 10 miles south of Cape Canaveral Air Force Station.

Patrick Air Force Base provides support for the people and mission of the Eastern Space and Missile Center. Cape Canaveral Air Force Station includes a system of missile launch facilities used to place satellites in orbit. A description of Cape Canaveral Air Force Station and its environment is provided in Table 2-7.

Launch Complex 41 at Cape Canaveral is being recommissioned to support launches of the Titan IV vehicle. The process of preparing and launching a satellite takes about 30 weeks and involves the following: (1) checking the satellite to ensure that all systems are functioning correctly; (2) assembling the launch vehicle and mating the payload to the vehicle in a vehicle integration building; (3) transporting the stacked assembly to the launch pad; and (4) launching the vehicle. The Titan IV vehicle is lifted off and boosted to over 100,000 feet by solid-fuel boosters before the liquid fuel second-stage vehicle fires.

The Eastern Test Range includes a broad area of the Atlantic Ocean which extends offshore from Patrick Air Force Base and Cape Canaveral Air Force Station on the coast of Florida (Figure 2-6) to the Indian Ocean. The range functions as the test area for space and missile operations. It includes a network of tracking and data gathering facilities on islands in the Atlantic, supplemented by ships and aircraft (63). Its radar, optic, telemetry, and communications instrumentation acquire data that support launches from Cape Canaveral and the Kennedy Space Center (52). Launch and spacecraft operations are monitored and supported by the Air Force Satellite Control Facility, the Consolidated Space Operations Center, and the MILSTAR satellite communication system.

For socioeconomic purposes, the supporting region for Cape Canaveral Air Force Station is defined as the surrounding Brevard County, and the community of Orlando to the west. Selected socioeconomic data for these areas are presented in Table 2-8.



LOCATION MAP OF CAPE CANAVERAL AIR FORCE STATION, FLORIDA

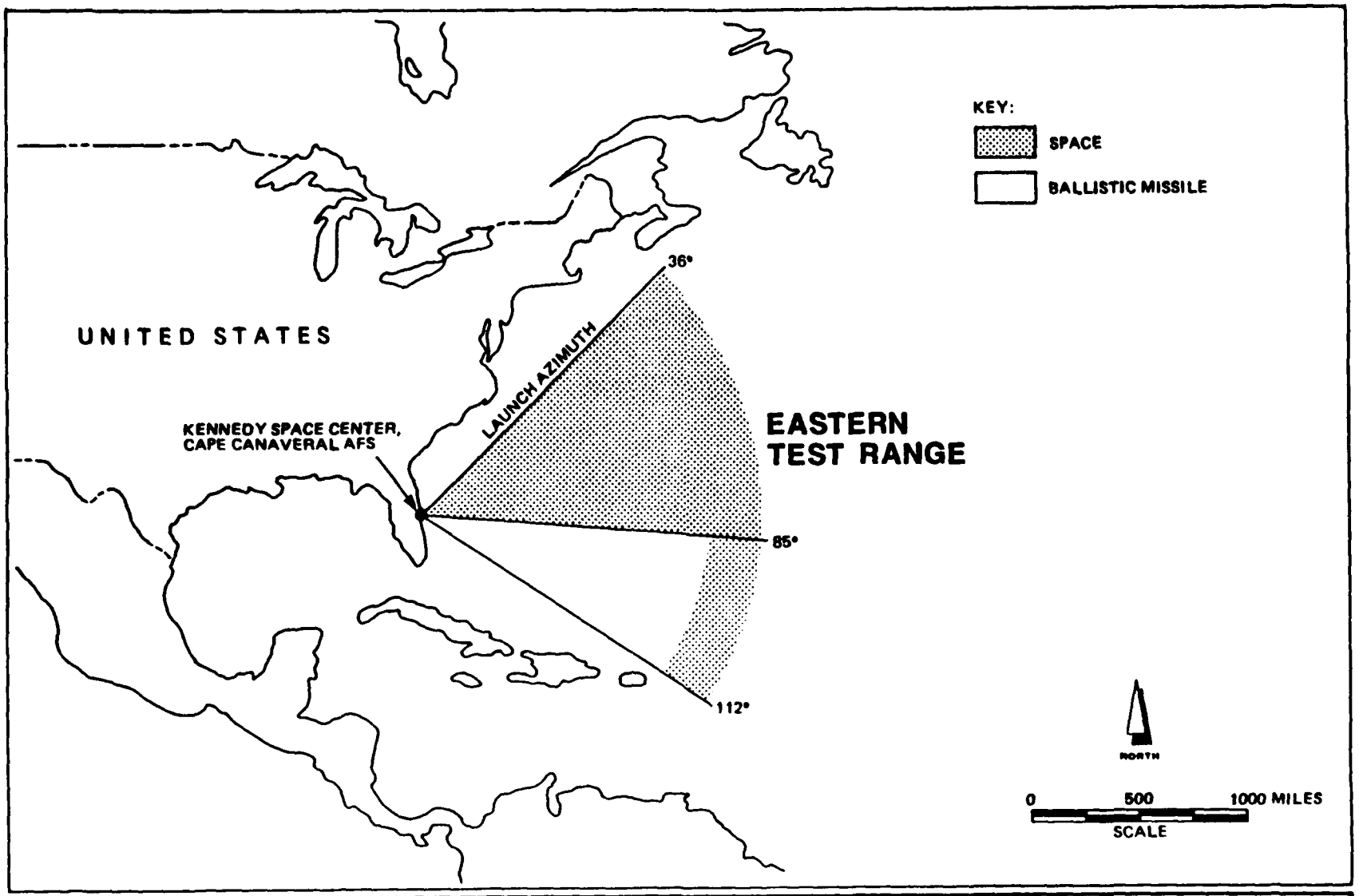
FIGURE 2-5

TABLE 2-7
SELECTED ENVIRONMENTAL CHARACTERISTICS
CAPE CANAVERAL AIR FORCE STATION

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	16,000 acres	64
		BASE FACILITIES	All housing, recreational, and support facilities are located at Patrick Air Force Base 15 miles to the south. Cape Canaveral Air Force Station contains the Air Force Space Museum, range control center, and missile launch and support facilities.	64
		TEST FACILITIES	Complete assembly and launch facilities for ballistic missiles and space launch vehicles, and storage and dispensing station for fuels and oxidizers.	64
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	Commercial fishing offshore; no natural resource development on base	25
		VISUAL RESOURCES	Located on barrier island bounded by the Banana River on the west and the Atlantic Ocean to the east. The barrier island is approximately 10 miles wide at Cape Canaveral Air Force Station, and relief is generally less than 12 feet, with occasional dunes 12 to 24 feet high. Natural features include lagoons, beaches, dunes, and native vegetation.	66
		SPECIAL STATUS	Seven historical and archaeological sites on National Register of Historical Places. 21 additional sites eligible for list. Federally listed endangered species include: Wood Stork, Manatee, Green Turtle, Leatherback Turtle, Brown Pelican, and Bald Eagle. Federally listed threatened species include the Peregrine Falcon, Loggerhead Turtle, Eastern Indigo Snake, and American Alligator. The beach at Cape Canaveral Air Force Station is considered a habitat of special significance by the Base. The Banana River is designated outstanding by the State of Florida.	25
		NOISE	No exceedances	24
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Military = 4,494; Civilian = 1,640 (1987, For Patrick Air Force Base)	18
		PAYROLL	$190.6 million (1987; for Patrick Air Force Base)	18
		HOUSING	Officer = 168; NCO = 1,408 (1987; for Patrick Air Force Base)	18

TABLE 2-7 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
CAPE CANAVERAL AIR FORCE STATION

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Average daily demand = 383 kWh; Peak hour demand = 50,000 kW; supplied by offbase plant operated by Florida Power and Light Company	36, 38
		SOLID WASTE	14,000 tons generated in FY 1986; disposed at offsite facility in Brevard County as of January 1987. Onsite facility used only for construction debris.	24, 36, 38
		SEWAGE TREATMENT	Capacity = 983,000 gallons/day; current use is approximately 80% of capacity. Facility is onbase government-owned and operated.	36, 37, 38
		TRANS-PORTATION	Cape Road is the main road in and out of Cape Canaveral AFS, and is quite congested. Indefinite plans are to widen road from south entrance to industrial portion of Cape Canaveral AFS.	38
		WATER SUPPLY	Consumption = 2.27 million gallons/year, purchased by contract from the City of Cocoa.	36, 39
PERMIT STATUS		AIR	Air shed classification II; attainment of air quality standards; several boiler permits with the state of Florida	24
		WASTE WATER	NPDES permit for several canals from one monitored outfall; Monitoring of canal surface water shows no exceedances.	24
		HAZARDOUS WASTE	84 tons generated for FY 1986 with no violations; storage facility with RCRA permit; munitions detonation facility with interim status.	24
ADDITIONAL ENVIRONMENTAL INFORMATION	Existing Base Comprehensive Plan. Two separate Environmental Assessments in progress for two new launch facilities. Environmental Assessment for Complementary Expendable Launch Vehicle (CELV) at Cape Canaveral.			22, 25
COMMENTS	The data presented on this table summarize conditions for Cape Canaveral AFS, and do not include data for Patrick AFB unless otherwise noted.			



LOCATION MAP OF EASTERN TEST RANGE

FIGURE 2-6

TABLE 2-8.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION CAPE CANAVERAL AIR FORCE STATION AND KENNEDY SPACE CENTER

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
Brevard County					
Population	230,006	272,959	329,497	1.73	4.82
Year-Round Housing	77,871	112,970	N/A	3.79	N/A
Vacancy Rate (%)	11.9	9.9	N/A	--	--
Civilian Labor Force	87,987	121,034	140,078	3.24	3.72
Unemployment (%)	5.6	5.9	5.3	--	--
Per Capita Income ($)[1]	3,297	7,448	10,426	--	--
Median Family Income ($)[1]	11,144	19,388	N/A	--	--
Orlando					
Population	100,081	128,291	137,145	2.51	1.68
Year-Round Housing	36,827	51,344	N/A	3.38	N/A
Vacancy Rate (%)	8.0	7.2	N/A	--	--
Civilian Labor Force	39,169	58,189	77,566	4.04	7.45
Unemployment (%)	4.6	4.6	5.5	--	--
Per Capita Income ($)[1]	2,985	6,735	9,439	--	--
Median Family Income ($)[1]	7,945	16,125	N/A	--	--

References: 43, 44, 45, 47

[1] Income figures refer to preceding year

Based on available data, Cape Canaveral Air Force Station is in compliance with all Federal standards for air quality, water quality, and hazardous waste. Environmental assessments are currently in preparation for two new launch facilities at Cape Canaveral. The "Environmental Assessment for the Complementary Expendable Launch Vehicle (CELV) Program at Cape Canaveral Air Force Station" has been prepared to support refurbishment and operational activities for the Titan IV vehicle (22). Environmental documentation is prepared for individual launches from Cape Canaveral Air Force Station (26).

2.5 KENNEDY SPACE CENTER

Kennedy Space Center is located between the Banana River and the Atlantic Ocean in Brevard County on Florida's east coast (Figure 2-7) approximately 10 miles east of Titusville. Kennedy Space Center is located adjacent to Cape Canaveral Air Force Station to the north and west. Patrick Air Force Base is approximately 10 miles south. Kennedy Space Center is operated by the National Aeronautics and Space Administration and coordinates logistical and operational activities with Cape Canaveral Air Force Station and the Eastern Test Range. Facilities include launch pads for expendable missiles and the Space Shuttle. A description of the facility and its environment is provided in Table 2-9.

The Space Shuttle program at Kennedy Space Center is designed to support a wide variety of space missions. These activities include: carrying multiple payloads into orbit, servicing and refurbishing low-Earth-orbit satellites, retrieving and returning payloads, performing experimentation and technology development missions, carrying passengers in relative comfort, and launching from orbit satellites and spacecraft which require the attainment of high-orbital and Earth escape velocities (30). During 1985, there were nine shuttle launches, which was the greatest number of launches for a single year since the initial launch in 1981 (20). Launching of the Space Shuttle is planned to commence in 1988 with two launches, and is expected to increase to eight per year within the next 4 years (20).

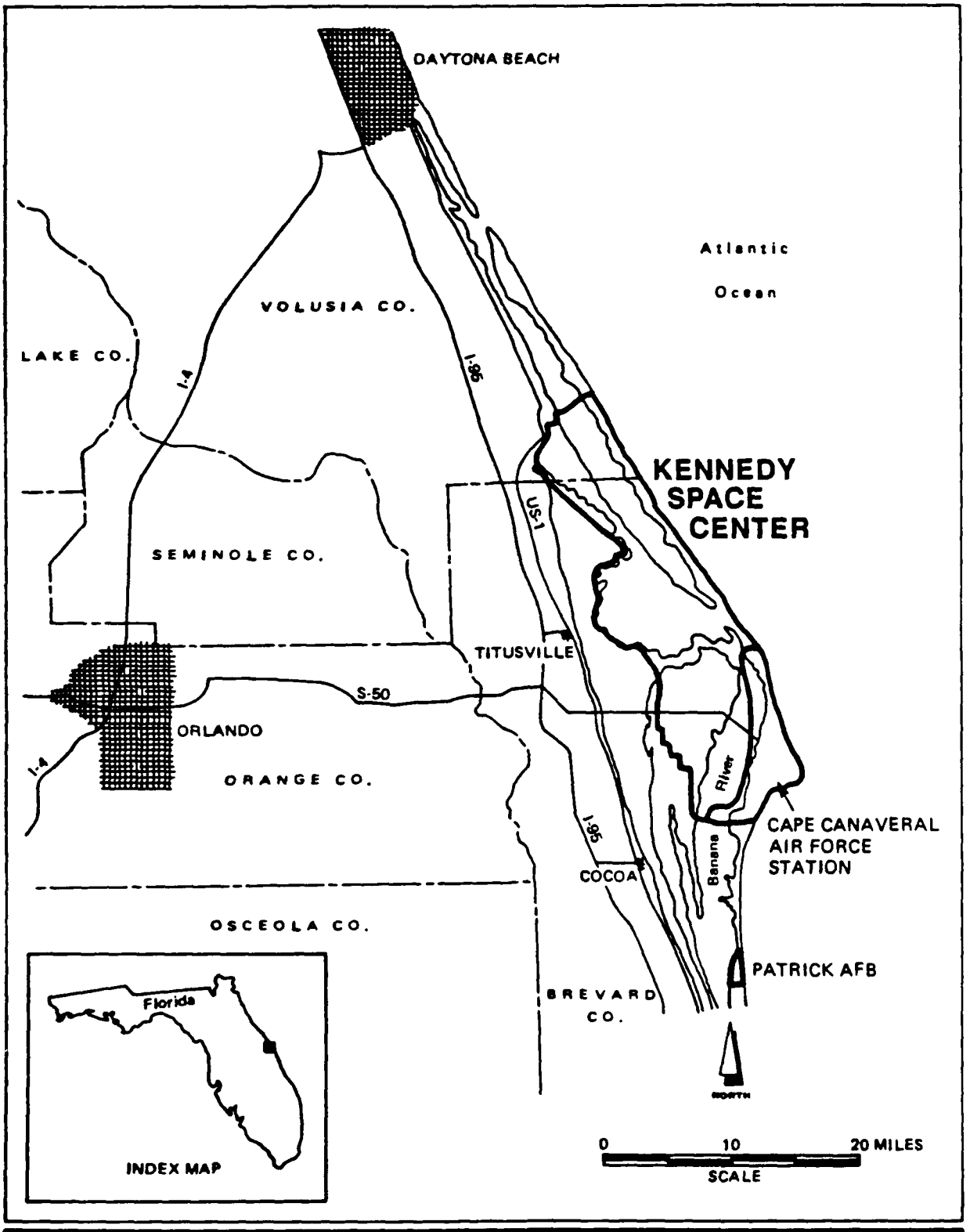
For socioeconomic purposes, the supporting region for Kennedy Space Center is defined as the surrounding Brevard County, and the community of Orlando to the west. Selected socioeconomic data for these areas were presented in Table 2-8.

Based on available data, Kennedy Space Center is in compliance with Federal standards for air quality, water quality, and hazardous waste.

Operation of Kennedy Space Center is addressed in the "Environmental Impact Statement for the Kennedy Space Center," October 1979 (31). Environmental documentation for Space Shuttle operations at Kennedy Space Center includes the Environmental Impact Statement, April 1978 (30), and environmental documents prepared for each individual launch (19).

2.6 NATIONAL TEST FACILITY

The National Test Facility will be constructed at Falcon Air Force Station (54). An interim facility will be operated out of the existing Consolidated



LOCATION MAP OF KENNEDY SPACE CENTER, FLORIDA

FIGURE 2-7

TABLE 2-9
SELECTED ENVIRONMENTAL CHARACTERISTICS
KENNEDY SPACE CENTER

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	140,000 acres	31
		BASE FACILITIES	Administrative and engineering office buildings, recreational area, emergency power generating plant, Visitors Center, rocket booster assembly and refurbishment facilities.	31, 32
		TEST FACILITIES	Space transportation vehicles, expendable launch vehicles, remote sensing facilities, laser advanced communication development, launching facilities (39A, 39B) orbiter processing facilities, shuttle landing facilities	31, 32
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	No known natural resource development onbase.	32
		VISUAL RESOURCES	Bordered on west by the Indian River, a brackish-water lagoon, and on the east and south by Cape Canaveral Air Force Stateion. The Banana River lies between Merritt Island and Cape Canaveral Air Force Station, and contains the submerged land included as part of Kennedy Space Center. The terrain is flat and only a small part of the total acreage is developed.	32, 66
		SPECIAL STATUS	Federally listed endangered species include: Atlantic Green Turtle, Leatherback Turtle, Atlantic Hawksbill Turtle, Atlantic Ridley Turtle, Dusky Seaside Sparrow. Federally listed threatened species include: American Alligator, Eastern Indigo Snake, Atlantic Salt Marsh Water Snake, and Piping Plover. Space Center habitats include 29,000 acres of wetlands and 56,000 acres of open waters. There are 28 archaeological and historical sites present on the Center. Launch Complex 39 is listed in the National Register of Historical Places.	31, 32
		NOISE	Ambient level appreciably lower than EPA recommended level of 70 decibels. Observer and security zones are located on a basis of 115 decibel maximum for visitor protection during vehicle launches.	31, 32
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Total = 1400, few military, approximately 200 civilian; remaining staff are contractor employees.	70
		PAYROLL	Contractor only = $750 million	70
		HOUSING	None	70

TABLE 2-9 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
KENNEDY SPACE CENTER

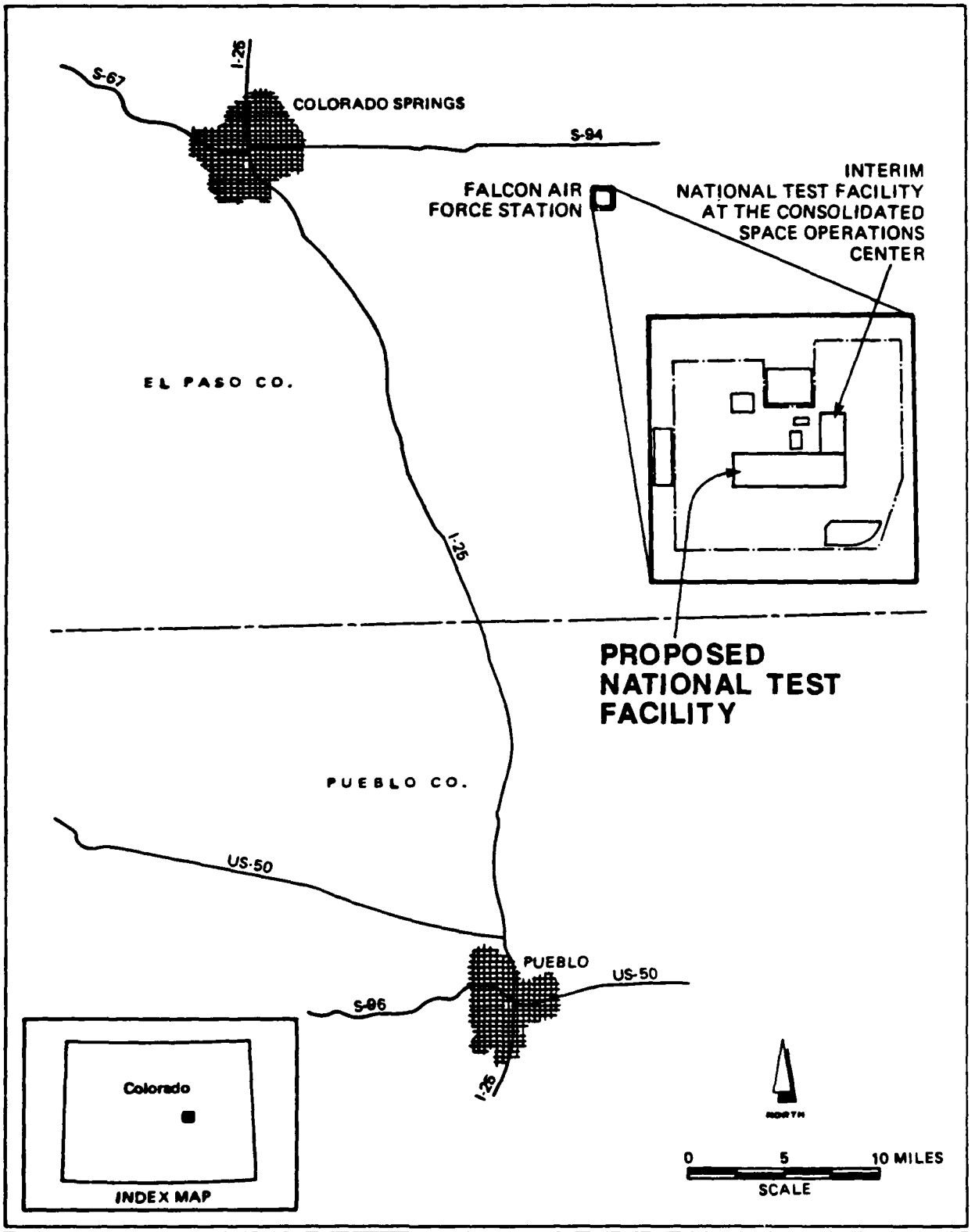
				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Average daily consumption for 1978 = 520,000 kWh Daily capacity currently sufficient for facility needs. Generated offsite by the Florida Power and Light Company.	31, 32
		SOLID WASTE	Volume produced in 1985 = 26,000 cubic yards; Capacity = 600,000 cubic yards. Disposal method: Class II sanitary landfill onsite with onsite treatment and recovery; offsite disposal of hazardous waste, radioactive waste	32
		SEWAGE TREATMENT	Design capacity = 797,000 gallons/day; current use = 233,100 gallons/day. Kennedy Space Center maintains permits for 16 onsite domestic waste treatment plants.	32
		TRANS-PORTATION	211 miles of roadway; approximately 40 miles of rail track provide heavy freight transport from the Florida East Coast rail line; 19.3 miles of maintained channel provide access from Port Canaveral to Kennedy Space Center.	32
		WATER SUPPLY	Average daily demand in 1978 = 407,000 gallons. Daily capacity currently sufficient for facility needs. Purchased under contract with the Air Force from the City of Cocoa.	31
PERMIT STATUS		AIR	Within attainment of air quality standards. Although never exceeding standards, ozone has the most consistently high level of the monitored pollutants.	32
		WASTE WATER	Two NPDES outfall permits	31
		HAZARDOUS WASTE	Onsite treatment and recovery facilities for freon, hydrocarbons, mercury, and silver. RCRA Permit Part B, three storage facilities, tank, hypegolic propellant incineration, and chemical waste treatment facility.	31, 32
ADDITIONAL ENVIRONMENTAL INFORMATION	Environmental Resources Document (Nov. 18, 1986); Environmental Impact Statements for the Kennedy Space Center Center (October 1979); Environmental Statement for the National Aeronautics and Space Administration, Office of Space Science, Launch Vehicle and Propulsion Programs (July 1973). Environmental documentation is prepared for all Space Shuttle launches.			26, 29, 31, 32
COMMENTS				

Space Operations Center, also located at Falcon Air Force Station. This facility is in El Paso County, Colorado, about 12 miles east of Colorado Springs (Figure 2-8). The present mission of the Consolidated Space Operations Center is to provide support for military space operations through communications centralization and data link operations. The facility and its environmental characteristics are described in Table 2-10.

The Consolidated Space Operations Center was built to house two mission elements: the Satellite Operations Center and the Space Shuttle Operations Center (56). The former performs command, control, and communications service functions for orbiting spacecraft. The latter was to conduct DoD Shuttle flight planning, readiness, and control functions. The interim National Test Facility could be located at the Consolidated Space Operations Center because adequate support facilities are available (60).

For the purpose of socioeconomic assessment, the supporting region for this facility is defined as the surrounding El Paso County and the nearby community of Colorado Springs. Relevant socioeconomic data for these areas are contained in Table 2-11.

Based on available data, the Falcon Air Force Station, including the Consolidated Space Operations Center and the proposed location of the National Test Facility, is in compliance with Federal standards for air quality, water quality, and hazardous waste. Environmental documentation has been prepared for both the National Test Facility (National Test Facility Environmental Assessment) (54) and for the interim National Test Facility at the Consolidated Space Operations Center (Categorical Exclusion, control number AFSPC 86-1) (60).



LOCATION MAP OF NATIONAL TEST FACILITY AT FALCON AFS, COLORADO

FIGURE 2-8

TABLE 2-10
SELECTED ENVIRONMENTAL CHARACTERISTICS
NATIONAL TEST FACILITY

				REFERENCE NO.
PHYSICAL CHARACTERISTICS	FACILITIES	SIZE	640 acres	1
		BASE FACILITIES	Administrative offices, communications network	54
		TEST FACILITIES	Advanced communications network capabilities	54
	ENVIRONMENTAL CONDITIONS	NATURAL RESOURCES	None on facility	8
		VISUAL RESOURCES	Region consists of gently rolling plains characterized by semiarid grasslands used for agricultural grazing; Falcon Air Force Station is considered developed, as high-technology buildings and support facilities dominate the landscape.	54
		SPECIAL STATUS	None on facility	8
		NOISE	Current ambient noise level is 40 L_{dn}, which is below acceptable limits.	7
OPERATIONAL CHARACTERISTICS	SOCIOECONOMICS	STAFFING	Military = 895, Active Duty; Civilian = 2,088 (1987, at Falcon Air Force Station)	58, 65
		PAYROLL	$0.9 Million (1987; Civilian payroll, at Falcon Air Force Station)	18, 65
		HOUSING	Officer = 106; NCO = 384; Transient = 130; (1987; at Peterson Air Force Base, no known housing at Falcon Air Force Station)	18

TABLE 2-10 (Continued)
SELECTED ENVIRONMENTAL CHARACTERISTICS
NATIONAL TEST FACILITY

				REFERENCE NO.
OPERATIONAL CHARACTERISTICS (Continued)	INFRASTRUCTURES	ELECTRICITY	Peak daily demand = 6,100 kWh for Consolidated Space Operations Center; Capacity = 15,000 kW; can be expanded to 25,000 kW	54
		SOLID WASTE	Disposed offsite at licensed landfill by private contractor	7
		SEWAGE TREATMENT	Design capacity = 0.069 millon gallons/day; designed to support 2,300 Base personnel	54
		TRANS-PORTATION	Access to Falcon AFS provided by State Highway 94 and Enoch Road. Current traffic at Enoch Road = 1,550 vehicles/day, capacity 11,300 vehicles/day. Current traffic at SH 94 = 3,500 vehicles/day, capacity 16,000 vehicles/day.	54
		WATER SUPPLY	The Cherokee Water District contract with Falcon Air Force Station limits delivery of water to 0.479 million gallons per day. Existing peak water demands at the installation are estimated at 0.409 million gallons per day.	54
PERMIT STATUS		AIR	Attainment by Colorado standards (Falcon AFS is located outside the Colorado Springs non-attainment areas for carbon monoxide and total suspended particulates)	7
		WASTE WATER	NPDES Permit is in place for wastewater that is discharged offbase into lagoons.	7
		HAZARDOUS WASTE	Potential Hazardous Wastes: electrolytes, sodium hydroxide, sodium sulphide, dichlorodiflouromethane, sulfur dioxide, SSP-55 all in very small amounts; offsite disposal by Defense Reutilization Management Office	7
ADDITIONAL ENVIRONMENTAL INFORMATION	No environmental compliance plan available. The Base Master Plan is being developed and is expected to be completed in June 1988; there are no land use or zoning conflict issues. Current EA: National Test Bed Program, 1987; Final Environmental Impact Statement, Consolidated Space Operations Center, January, 1981			54, 8
COMMENTS	National Test Facility has categorical exclusion as stated in document 813 (control # AFSPC 86-1) dated 8-12-86. Data is for Falcon Air Force Station, unless otherwise noted.			69, 60

TABLE 2-11.
SELECTED SOCIOECONOMIC INDICATORS FOR THE SUPPORTING REGION
NATIONAL TEST FACILITY

Area/Indicator	1970	1980	1984	Annual Change 1970-1980 (%)	Annual Change 1980-1984 (%)
El Paso County					
Population	235,972	309,424	349,066	2.75	3.06
Year-Round Housing	72,913	116,770	N/A	4.82	N/A
Vacancy Rate (%)	7.3	7.7	N/A	--	--
Civilian Labor Force	71,085	130,297	163,883	6.25	5.90
Unemployment (%)	5.5	7.6	5.4	--	--
Per Capita Income($)[1]	2,920	7,027	9,812	--	--
Median Family Income ($)[1]	8,974	18,729	N/A	--	--
Colorado Springs					
Population	140,512	215,105	247,739	4.35	3.59
Year-Round Housing	46,502	88,189	N/A	6.61	N/A
Vacancy Rate (%)	7.7	7.9	N/A	--	--
Civilian Labor Force	46,414	98,140	123,504	7.78	5.92
Unemployment (%)	5.7	7.4	5.3	--	--
Per Capita Income ($)[1]	3,001	7,404	10,292	--	--
Median Family Income ($)[1]	9,089	18,987	N/A	--	--

References: 43, 44, 45, 47

[1] Income figures refer to preceding year

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3. ENVIRONMENTAL CONSEQUENCES

This section assesses the potential environmental consequences of the proposed SSTS tests. It is based on a comparison of the tests described in Section 1 and the facilities to be utilized at proposed test locations, as described in Section 2. Any identified environmental documentation that addresses the types of activities proposed for the facilities is incorporated by reference.

Many of the tests for the SSTS Demonstration/Validation program would be conducted at contractor facilities that have not been identified. The contractors would be selected through the DoD procurement process and would be required to meet all Federal, State, and local environmental laws and regulations necessary for facility operations. If the procurement process required a selected contractor to use Federal funds to conduct an activity with a potential for significant environmental consequences, an environmental analysis of the consequences of such activities would also be required of the contractor. This analysis would be utilized by DoD in completing an environmental assessment or environmental impact statement, as appropriate.

The approach used to complete the Environmental Assessment of the SSTS Demonstration/Validation program was described in Section 1. To assess the potential for and the magnitude of impacts from Demonstration/Validation at each government facility, a two-step methodology was utilized (Figure 3-1). The first step was the application of assessment criteria to identify activities with no potential for significant environmental consequences. Activities were deemed to present no potential for significant environmental consequences if they met all of the following criteria (i.e., all "yes" answers):

1. Are the facility and its infrastructure adequate for the proposed activity (i.e., can the tests be conducted without new construction, excluding minor modifications)?

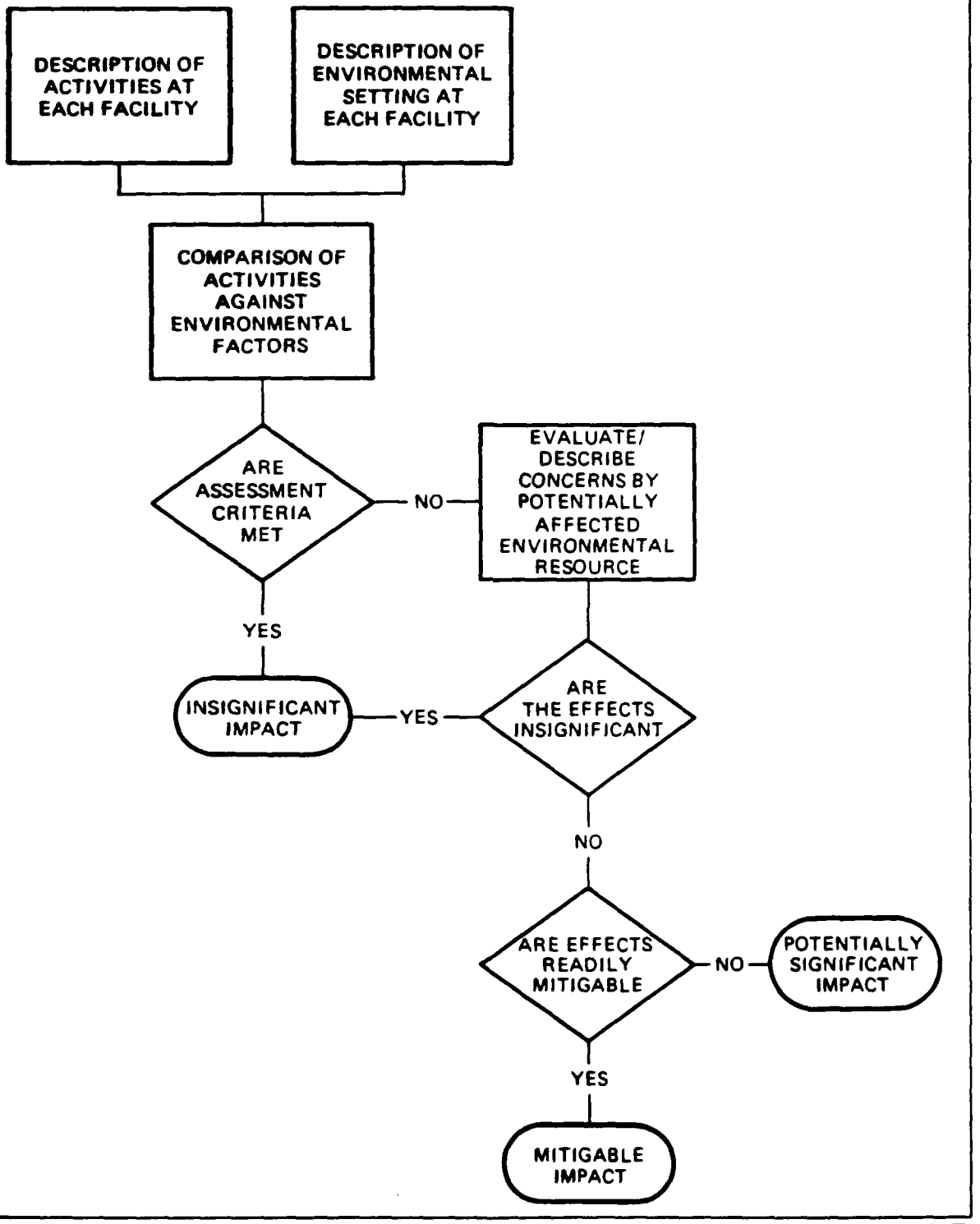
2. Is current staffing at the facility adequate to conduct the test, excluding minor staff level adjustments?

3. Does the facility comply with existing environmental standards?

4. Are the resources of the surrounding community adequate to accommodate the proposed testing?

If a proposed test was determined to present a potential for impact (i.e., a "no" answer to any of the above questions), the second step was to evaluate the activity in the context of the following environmental considerations: air quality, water quality, biological resources, infrastructure, hazardous waste, land use, visual resources, cultural resources, noise, and socioeconomics. As a result of that evaluation, consequences were assigned to one of three categories: insignificant, mitigable, or potentially significant.

Environmental consequences were determined to be **insignificant** if, in the judgment of the analysts or as concluded in existing environmental documentation, no potential for significant environmental impacts exists.



METHOD FOR ASSESSING
POTENTIAL ENVIRONMENTAL CONSEQUENCES

FIGURE 3-1

were deemed **mitigable** if concerns exist but it was determined that all potential consequences could be readily mitigated through standard procedures or by measures recommended in existing environmental documentation. If serious consequences exist that could not be readily mitigated, the activity was determined to represent **potentially significant** environmental impacts.

The remainder of this section provides discussions of the potential environmental consequences for each government location proposed for the SSTS Demonstration/Validation program. The impacts of the no-action alternative and irreversible and irretrievable commitments of resources that would accompany SSTS Demonstration/Validation are described at the end of this section.

3.1 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

3.1.1 Arnold Engineering Development Center

SSTS Demonstration/Validation test activities at the Arnold Engineering Development Center would involve simulation of space environments for satellite components and assemblies. This is a normal mission for the facility; however, a space simulation chamber of the necessary size would have to be constructed to accommodate SSTS testing (12).

Additional staff requirements for the new space chamber facility are indeterminate. Current military, civilian, and contractor staffing is approximately 4,100 persons (2, 12). Applying the four assessment criteria against the test activities and the required facility modifications reveals a potential for environmental effects related to construction of a new space chamber and a potential increase in facility staffing. Thus, a more detailed assessment addressing each of the environmental considerations was completed and is presented below.

Air Quality

Currently, Arnold Engineering Development Center is located in an attainment area; there are 27 Prevention of Significant Deterioration permits with no violations (4, 17). Based on past regulatory compliance, no significant air quality impacts are expected from the operation of the space chamber. Potential construction impacts are mitigable by standard control measures.

Water Quality

There are eight National Pollution Discharge Elimination System permits for Arnold Engineering Development Center; one permit violation has been identified (4, 10). This occurred at the main sewer and was caused by excessive infiltration that was not associated with space chamber operations. Based on past regulatory compliance, no significant water quality impacts are expected in the operation of the space chamber. Potential impacts of construction and operation of the new space chamber will be addressed in an environmental assessment to be prepared by Arnold Engineering Development Center when engineering design is 35 to 60 percent complete (11). At present, potential construction impacts appear mitigable by standard control measures.

Biological Resources

Three endangered species have been identified at Arnold Engineering Development Center (13). The effect of space chamber operations on endangered species is anticipated to be insignificant because the space chamber would be located in a developed area. However, any activities that could potentially impact those species would require review and approval by the U.S. Fish and Wildlife Service as required by the Endangered Species Act of 1973 and would have to be addressed in the forthcoming environmental assessment.

Infrastructure

Evaluation of the effects on each of the infrastructure components follows:

- Electricity is currently provided by a commercial supplier; demand is less than 50 percent of the supply (27). As a result, the addition of one space chamber is not anticipated to increase demand beyond capacity.

- Solid waste is disposed onbase at one landfill contracted to the city of Tullahoma; it is estimated to be filled to capacity by December 1987 (27). The space chamber would not generate significant amounts of solid waste. Disposal of construction debris is expected to be addressed in the forthcoming environmental assessment; the impact is not expected to be significant.

- Sewage treatment is currently below capacity (3). Although staffing requirements for the space chamber are indeterminate at present (12), additional staff are not expected to cause exceedance of capacity.

- Water demand is currently below capacity (3). Consequently, the addition of one space chamber is not expected to exceed capacity.

- Transportation routes at the Arnold Engineering Development Center are below network capacity (17, 40). Although space chamber staffing requirements are indeterminate at present (12), no significant impact is expected because of the rural setting and adequate road network.

Hazardous Waste

A storage facility at Arnold Engineering Development Center is currently awaiting Resource Conservation Recovery Act Part B public notification (4, 19). Based on the regulatory compliance history of the facility, continued compliance is anticipated for activities associated with the new space chamber.

Land Use

The new space chamber would be constructed adjacent to existing industrial development and would not conflict with existing land use. Land use is anticipated to be in compliance with the revised base master plan (4).

Visual Resources

Impacts to the visual resources of the area would be insignificant because the space chamber would be constructed within an industrial complex which is screened by forest (55).

Cultural Resources

There are no known or designated historical or archaeological sites at the Arnold Engineering Development Center (17).

Noise

Because noise generated within certain test areas of the Arnold Engineering Development Center is above prescribed safety levels, Office of Safety and Health Administration requirements apply. Construction and operation of a new space chamber is anticipated to increase the noise levels generated. However, noise outside the test areas is mitigated by (1) the facility's location in a large reservation 5 miles from the nearest community and surrounded by 6,000 acres of dense pine trees, (2) adequate mufflers for facility exhausts, and (3) selective scheduling of testing operations (17, 55).

Socioeconomics

The lack of specific information on proposed staffing and expenditures limits the possibility of assessing potential socioeconomic impacts. However, based upon available socioeconomic data for the supporting region of the Arnold Engineering Development Center, use of this facility for SSTS Demonstration/Validation operations is unlikely to have a significant impact. Although the population for the supporting region is below 100,000, it has experienced sustained moderate growth over the past two decades. The civilian labor force has high unemployment, and hence can absorb increased economic activity. Area housing has a vacancy rate capable of accommodating a moderate influx of population.

Environmental consequences associated with facility construction and operation are anticipated to be mitigable; therefore, no significant environmental impacts are anticipated for SSTS Demonstration/Validation activities at Arnold Engineering Development Center. Any impacts and mitigation measures will be further addressed in the environmental assessment prepared by Arnold Engineering Development Center for the new space chamber.

3.1.2 Nevada Test Site

Demonstration/Validation activities for SSTS at the Nevada Test Site would include the exposure of components and assemblies to a nuclear environment. The dedicated use of the Nevada Test Site includes such activities (14) and SSTS testing would take advantage of underground nuclear tests scheduled for other programs. No facility modifications are anticipated and no additional staff or infrastructure services would be necessary as a consequence of SSTS activities (14, 48, 67). Also, the Nevada Test Site meets all applicable environmental standards. Therefore, the environmental consequences of the SSTS activities at the Nevada Test Site are expected to be insignificant.

3.1.3 Vandenberg Air Force Base/Western Test Range

A space surveillance experiment would be conducted as part of the SSTS program, which would involve the launch of one vehicle--either a Titan IV missile or the Space Shuttle. Launch of the Titan IV would require modification of a Titan III launch facility or construction of a new facility designed specifically for the Titan IV (6). Launch of the Space Shuttle would require returning the Shuttle launch facility to full operational capability. Additional facilities might be required for either Titan IV or Space Shuttle launches. An environmental impact statement addressing construction and operation for the Space Shuttle launch facility was prepared (58). An environmental impact statement addressing construction and operation of a Titan IV launch facility is in preparation (5).

Applying the four assessment criteria against the test activities and the facility modifications they would require reveals a potential for environmental effects related to the modification of a Titan III launch facility or construction of a new Titan IV facility and to the possible increase in facility staffing. Thus, a more detailed assessment addressing each of the environmental considerations was completed.

As is normal for launches from Vandenberg Air Force Base, the one SSTS launch will activate the Western Test Range. The Western Test Range is activated 60 to 70 times each year. The use of the range for the one launch associated with SSTS would not result in any significant impacts.

The Western Test Range was also evaluated against the four assessment criteria. The result of this evaluation was a determination that the four criteria are met.

The results of the assessment of each of the environmental considerations are presented below.

Air Quality

Vandenberg Air Force Base currently meets all ambient air quality standards. Offsets for emissions from Shuttle launches are available. If the Shuttle launches do not occur, these offsets would be adequate for Titan IV launches (42). Possible construction impacts are mitigable by standard control measures.

Water Quality

There are 15 National Pollution Discharge Elimination System permitted locations on Vandenberg Air Force Base (34). Operation of the facility for a Space Shuttle launch will have a minimal impact on the hydrology of the Vandenberg area (58). Concerns for a Titan IV launch will be addressed in an environmental assessment for Titan IV launch facilities. Although based on the minimal effects predicted for Space Shuttle facilities, the effects of Titan IV are also expected to be insignificant (58, 62).

Biological Resources

Seven federally listed threatened and endangered species are present on Vandenberg Air Force Base (53). A critical habitat for one of the endangered species is located near the Peacekeeper launch area, but launches of the Space Shuttle or Titan IV missiles would not affect this area (53). The threatened and endangered species are subjected to vibration from launches and could be affected by catastrophic explosions (35). Vibration impacts are not considered significant and catastrophic explosions are unlikely. Effects of a Titan IV launch on threatened and endangered species will be addressed in the Titan IV environmental impact statement in progress. Space Shuttle operations would be expected to produce slight transient impacts on threatened and endangered aquatic and terrestrial biota (30).

Infrastructure

Evaluation of the effects on each of the infrastructure components is as follows:

- Electricity demand, which is currently below capacity, is supplied by the Pacific Gas and Electric Power grid (15, 35). Any increases in demand as a result of SSTS activities at Vandenberg Air Force Base would be supplied by the company.

- Solid waste is currently disposed at five offsite facilities with adequate capacity (15, 53). As a result, no significant impact is expected from a Titan IV or Space Shuttle launch.

- Sewage treatment capacity is currently three times the waste generated (15, 53, 57). Any associated increase in staff for a Titan IV or Space Shuttle launch is not expected to exceed capacity.

- Regionally, the water supply of two aquifers is being overdrawn (53, 57). It is estimated that for each group of 1,000 people brought in, an additional 110 acre-feet/year would be drawn down. The Draft Environmental Impact Statement, Mineral Resource Management Plan, states that concerted efforts to plan and enforce water management programs can prevent serious impacts to water supply (53).

- Transportation routes to the base are near or at capacity; roads on base have excess capacity and access to launch areas is restricted several hours before launches (35, 53). Space Shuttle or Titan IV operations would exacerbate problems in the offbase transportation network.

Hazardous Waste

Vandenberg Air Force Base has a short-term hazardous waste storage permit; offbase disposal is by a private contractor (28). Additional hazardous waste would be generated by a Space Shuttle or Titan IV launch. It is anticipated that the additional hazardous waste would be handled by the disposal contractor.

Land Use

Launch facilities for the Space Shuttle or Titan IV are consistent with planning in the "Base Development Pattern" (35).

Visual Resources

Space Shuttle launch facilities have already been constructed; therefore, there are no additional visual resources impacts (58). A Titan IV launch facility would either be a refurbished Titan III facility or a newly constructed Titan IV facility located near an existing Titan III facility. In either case, no additional visual impacts are anticipated.

Cultural Resources

Six hundred known cultural resources, mostly archaeological sites, are located at Vandenberg Air Force Base (53). Two sites are listed in the National Register: one site is located in the Peacekeeper launch area at the north end of Vandenberg and the other is at the southern end of Vandenberg (53). The historical lighthouse at the southern end of the base is about 1 mile from the proposed Titan IV launch pad. The proposed activity is not likely to impact the site. Neither site is near the Space Shuttle launch facility. An environmental impact statement addressing Titan IV construction and operation is in preparation (6).

Noise

The Space Shuttle vehicle would be considerably larger than any missiles currently launched from Vandenberg (58). Maximum noise levels at the launch site would reach 170 dB for a few minutes. Maximum noise levels in Lompoc and the cantonment area would be in the range of 115 to 120 dB. Noise levels in Lompoc and the cantonment area are not expected to result in serious health problems; however, some people may find this noise objectionable (58). The Titan IV, a smaller launch vehicle, would have less impact than the Shuttle.

Socioeconomics

Based upon available socioeconomic data for the supporting region, the use of Vandenberg Air Force Base for SSTS Demonstration/Validation activities would not have a significant socioeconomic impact unless accompanied by substantial increases in staffing. This assessment is made in the wake of the recent curtailment of Space Shuttle activity at this facility, which has meant that much of the previously anticipated growth in the supporting region has not occurred. If Shuttle activity, with its associated personnel, is reinstated at Vandenberg during the same time as SSTS activities, then the total increase in base staffing may have a socioeconomic impact.

Environmental considerations associated with facility construction and operation are deemed mitigable. Thus, no significant environmental impacts are anticipated for SSTS Demonstration/Validation activities at Vandenberg Air Force Base.

3.1.4 Cape Canaveral Air Force Station/Eastern Test Range

Cape Canaveral Air Force Station/Eastern Test Range may be used for the one SSTS launch during Demonstration/Validation. This launch would utilize the new Titan IV booster to place the test satellite in orbit. Support facilities at Patrick Air Force Base, the tracking facilities of the Eastern Test Range, and other support from the Air Force Satellite Control Facility, the Consolidated Space Operations Center, and the MILSTAR satellite communications system would be utilized as needed. These activities are within the scope of operations at Cape Canaveral Air Force Station/Eastern Test Range.

Modification of Launch Complex 41 at Cape Canaveral will be required to accommodate Titan IV launches. Those modifications are in progress and will support several military space programs in addition to the proposed SSTS program (23). No new construction or modification of Eastern Test Range facilities would be required (23). The environmental consequences of the Titan IV Launch Complex construction and operation have been analyzed in "Environmental Assessment for the Complementary Expendable Launch Vehicle (CELV) Program at Cape Canaveral Air Force Station." Copies of this documentation may be obtained from the Public Affairs Office at Cape Canaveral Air Force Station.

No new staffing would be required to support SSTS activities at Cape Canaveral Air Force Station/Eastern Test Range. All Titan IV launches, including any utilized for the SSTS launch, would be staffed with existing permanent facility employees (23). Existing permanent infrastructure support facilities for Launch Complex 41 and the Eastern Test Range are adequate to support Titan IV launch activities (23).

Applying the four assessment criteria against the test activities and the facility modifications they would require shows the potential for environmental effects related to the modification of the Titan IV Launch Complex 41 at Cape Canaveral. Thus, a more detailed assessment addressing each of the environmental considerations for activities at Cape Canaveral was completed.

The other three assessment criteria at Cape Canaveral Air Force Station are met. With no staff increases there would be no additional pressure placed on the resources of the surrounding communities. In addition, the facilities at the Cape Canaveral Air Force Station are currently in compliance with all permit requirements and the resources of the surrounding community are adequate (24).

The Eastern Test Range was also assessed against the four criteria. The result of this evaluation was a determination that the four criteria are met.

The results of the assessment of each of the environmental considerations are presented below.

Air Quality

Cape Canaveral Air Force Station currently meets State and Federal air quality standards (24). Launches would affect air quality through the release of

perchlorates, which combine with the atmosphere to form hydrochloric acid. The specific impacts and their mitigation through use of an oxidizer vapor scrubber are described in the environmental assessment for the Titan IV launch complex modification (23).

Water Quality

Current water discharges are permitted and monitoring shows no exceedances (24). Most washdown deluge water used during launches runs off onto the ground and is not monitored, but the water that is collected on the launch platform (30-40 percent of all washdown water) is tested and has been found to be clean enough for release. The impacts and mitigations are described in the environmental assessment for the Titan IV Launch Complex modifications (23).

Biological Resources

Threatened and endangered species are present in the area of Cape Canaveral (25). Any activities that may affect these threatened and endangered species must be reviewed and approved by the Fish and Wildlife Service as required by the Endangered Species Act of 1973 and would not proceed if proper mitigation were not applied.

Infrastructure

Evaluation of the effects on each of the infrastructure components is as follows:

- Electricity is currently supplied by Florida Power and Light (36, 38). No increases in demand over current capacity would result from SSTS test activities (23). Portable generators may be used to supplement permanent power supplies during Titan IV Launches (23).

- Solid waste is disposed offsite (24, 36, 38); additional increases that may result from SSTS activities would be only a small part of the approximately 14,000 tons generated annually. Thus, consequences are anticipated to be insignificant.

- Sewage treatment is currently at 80 percent of capacity (36, 37, 38). As no staff increases are needed to support SSTS activities, potential increases in sewage generation rates are considered minor. Thus, consequences are anticipated to be insignificant.

- Water is currently purchased from the City of Cocoa (36, 39). Deluge water would be required for one SSTS launch. This would represent an insignificant increase in consumption.

- Transportation routes to the Cape Canaveral Air Force Station are currently congested (38). However, since no additional staff would be required for SSTS activities there would be no increase in the current congestion.

Hazardous Waste

The existing hazardous waste storage facility is adequate for the management of any additional hazardous waste generated by SSTS activities (24).

Land Use

The modification of an existing launch platform would result in no conflict with land use as specified in the base comprehensive plan (25).

Visual Resources

The modification of the existing Launch Complex 41 would result in insignificant changes to the visual resources of the area.

Cultural Resources

Modification of the existing Launch Complex 41 would not result in disruption of undisturbed land. Thus, no impacts are anticipated on historical and archaeological sites.

Noise

There are no specific standards for noise levels; however, the Titan IV is less noisy than the Space Shuttle which has been launched from the adjacent Kennedy Space Center with no significant impacts (30). Therefore, anticipated impacts are deemed insignificant.

Socioeconomics

No new staff are projected to support SSTS activities. Thus, there would be no pressure on the housing and services provided by the surrounding communities and the socioeconomic impacts of SSTS are anticipated to be insignificant.

The environmental consequences associated with SSTS Demonstration/Validation activities at Cape Canaveral Air Force Station/Eastern Test Range are anticipated to be mitigable using the planned control measures (23).

3.1.5 Kennedy Space Center

A Space Shuttle vehicle from Kennedy Space Center may be used for the one launch of the SSTS during Demonstration/Validation. If this occurs, it would involve use of support facilities at Cape Canaveral Air Force Station, the tracking facilities of the Eastern Test Range, and numerous other communication and tracking facilities around the world. These activities are consistent with normal ongoing activities at Kennedy Space Center and the Eastern Test Range. Environmental documentation has been prepared prior to each Space Shuttle launch (26). If the Shuttle is used to support SSTS, it is anticipated that similar documentation would be prepared prior to launching. Copies of this documentation can be obtained from the Public Affairs Office at Kennedy Space Center.

The existing facilities would be adequate for launching the Space Shuttle. It is expected that staff available for Space Shuttle launches would be adequate

to support SSTS activities at Kennedy Space Center. The supporting infrastructure is also adequate for Space Shuttle launches. Kennedy Space Center is in compliance with applicable environmental standards (31, 32). Therefore, the environmental consequences of the SSTS activities at Kennedy Space Center are anticipated to be insignificant.

3.1.6 National Test Facility

The National Test Facility would be used for analysis and application of data from the flight test of the SSTS in simulation exercises. The functions of the National Test Facility for the SSTS tests are within the scope of the facility's design. Environmental effects of construction and operation of the National Test Facility are presented in the "National Test Facility Environmental Assessment" (54). This environmental assessment estimated that minor erosion during construction and minor impacts on air quality, ecology, groundwater supply, and vehicular traffic during operation would occur. It concluded that with the implementation of proposed mitigation measures, no significant impacts are anticipated. Copies of this environmental assessment may be obtained from the Public Affairs Office at Falcon Air Force Station.

Until the National Test Facility is constructed, the staff necessary to complete the SSTS tests will be located at existing facilities at Falcon Air Force Station. The environmental consequences of the proposed use of these existing facilities were addressed in a "Request for Environmental Impact Analysis," control number AFSPC 86-1 (60). The result of this request was an assessment that the interim National Test Facility qualified as a categorical exclusion in accordance with U.S. Air Force Categorical Exclusion 2x. This categorical exclusion states, "This is an administrative action utilizing interior space for personnel and computer equipment." Thus, no further environmental documentation is necessary. The categorical exclusion refers to the environmental impact statement for the Consolidated Space Operations Center (56). Copies of this document may be obtained from the Public Affairs Office at Falcon Air Force Station.

Operation of the National Test Facility would require a significant increase in the staff at Falcon Air Force Station. The previously completed "National Test Facility Environmental Assessment" (54) predicted the creation of approximately 2,300 permanent onsite jobs, as well as a daily average of 400 visitors (because each visit is likely to last a minimum of several days per visit, visitors were counted as equivalent to employees). Including the visitors, the total maximum daily population would thus be increased by 2,700. On the assumption that only 10 percent of the daily population would be drawn from the local area, it was predicted that more than 2,400 families would relocate to the area. No estimates of the portion of the staffing specific to SSTS have been made. While it can be assumed that only a portion of the total staffing is relevant to SSTS, the consequences of complete staffing are included as a worst-case analysis.

Applying the four assessment criteria against the test activities and the facility construction they would require shows the potential for environmental effects related to the construction and operation of the National Test Facility, the proposed staffing requirements of the Facility, and the resulting socioeconomic presence in surrounding communities. The assessment criteria for compliance with permits are met by the existing facilities (7, 9). The

results of the environmental analysis conducted for the National Test Facility are summarized below.

Air Quality

Current operations at Falcon Air Force Station are in attainment by Colorado standards. Once the National Test Facility is constructed, operations are predicted to add to an existing violation of the 1-hour and 8-hour carbon monoxide federal standard from automobiles at the intersection of Petersen Boulevard and Highway 94 outside the base (54). This addition can be mitigated through the use of van pools and other conservation measures.

Water Quality

All discharges are in compliance with current permits (7). The environmental assessment for the National Test Facility predicts no significant impact on groundwater or surface water quality (54).

Biological Resources

No threatened or endangered species are identified in the vicinity of the National Test Facility (54). Impacts to biological resources were predicted to be insignificant (54).

Infrastructure

Evaluation of the effects on each of the infrastructure components is as follows:

- The electrical substation can be expanded to 25,000 kW with additional cooling equipment. The National Test Facility will require the addition of 13,000 kW, which could be accommodated by expansion of the substation (54).

- Solid waste is disposed of offsite in a licensed landfill. The amount of solid waste that would be generated by the National Test Facility has not been estimated, but it is anticipated to be a relatively small volume (7).

- Sewage treatment capacity is currently adequate but the construction of the National Test Facility requires an expansion of the capacity of the sewage treatment plant by 0.124 million gallons/day (54). The expansion could encroach on a flood plain. All impacts are anticipated to be mitigable (54).

- Construction and operation of the National Test Facility are projected to increase water requirements from 0.37 million gallons/day to 1.0 million gallons/day (54). Mitigation measures such as conservation, reuse, and drought-tolerant landscaping would reduce the projected water requirements to 0.5 million gallons/day (54). Additional mitigation measures would have to be implemented to prevent exceeding water supply.

- o Transportation system capacity exceeds current traffic demands. The addition of the National Test Facility would create significant increases in vehicular traffic, but would be below design capacity; however, increased delays would occur at some intersections (54).

Hazardous Waste

Any hazardous waste would be disposed of in accordance with current applicable regulations (7, 9).

Land Use

There are no current land use or zoning conflicts (8). No conflicts are anticipated for the development and operation of the National Test Facility (54). Expansion of the sewage treatment plant could encroach on a flood plain. This impact can be mitigated through the use of standard flood control measures.

Visual Resources

The current visual landscape is a rolling agricultural grassland (54). The National Test Facility will have an insignificant additional impact on the visual resources because it will be adjacent to an existing building (54).

Cultural Resources

No cultural resources have been identified at the facility (54); therefore, impacts are anticipated to be insignificant.

Noise

Due to the administrative and industrial nature of the existing facilities on Falcon Air Force Station, impacts from construction and operation are anticipated to be insignificant (54).

Socioeconomics

Based on unemployment in El Paso County of 5.4 percent (8,800 persons) in 1984 and an adequate availability of housing, the socioeconomic impacts of the growth resulting from construction and operation of the National Test Facility would be insignificant (54).

The environmental consequences associated with the construction and operation of the National Test Facility are mitigable by the measures described in the "National Test Facility Environmental Assessment" (54). No significant environmental consequences have been identified associated with the operation of the interim National Test Facility based on the "Request for Environmental Impact Analysis" (control number AFSPC 86-1) (56, 60).

3.2 ENVIRONMENTAL CONSEQUENCES OF NO ACTION

If the no-action alternative is selected, no additional environmental consequences are anticipated. Concept Exploration would continue at currently staffed facilities with no changes in operations.

3.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Development of the single SSTS candidate satellite through Demonstration/Validation would result in irreversible and irretrievable commitment of resources such as electronic components, various metallic and nonmetallic structural materials, fuel, and labor. This commitment of resources is not different from those necessary for many other aerospace research and development programs; it is similar to the activities that have been carried out in previous aerospace programs over the past several years.

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APPENDIX A

TEST ACTIVITY DESCRIPTIONS

The Demonstration/Validation test activities have been divided into four categories: analyses, simulations, component/assembly testing, and flight testing. This Appendix describes in greater detail the simulations, component/assembly tests, and flight tests identified in Section 1.3.

SIMULATION TESTING

Simulation testing of a physical entity (machine, system component, etc.) is accomplished by developing a computer model of that entity. The model then interacts with data representing physical stimuli to assess the entity's capabilities in real-world conditions. A simulation involves writing and running computer programs, with possible interfaces to other systems or system elements. No impacts on the physical environment are involved other than the commitment of manpower and electrical energy involved in computer operations.

COMPONENT/ASSEMBLY TESTING

The basic concept of component/assembly testing is to control the physical conditions in which the hardware item is tested. Tests are typically conducted in specialized environments, and data are collected regarding the performance of the hardware item in that environment. The scope of the tests may range from single microchip components up to major subassemblies. This section describes those special environments and the tests to be performed.

Space Environment Chamber

A space environment chamber simulates some or all of the characteristics of space (thermal, vacuum, radiation, etc.) in order to closely emulate the space environment in which the test object is designed to operate.

Scene Generator

A scene generator is an optical environment simulator. It is used to drive optical processing equipment (e.g., surveillance systems) in test environments. A sequence of images is produced on an image display device (e.g., television screen). These sequences correspond to scenarios that are commonly encountered in the operational environment or are idealizations designed for testing specific performance aspects. The optical sensor element "views" the images by focusing the images on a detector component. The detected image is then passed to an interpreter which interprets the image and responds according to the interpretation. The responses are recorded for subsequent analysis. Power requirements are generally modest.

Nuclear Testing

Underground nuclear explosion testing is performed by drilling a vertical shaft and establishing a detonation chamber at the bottom. Test objects are placed in horizontal tunnels leading away from the detonation chamber, and

exposed to the high-intensity radiation pulse from the detonation. Usually one detonation serves many experiments and tests. Impacts on the physical environment include the commitment of an underground volume to radioactive contamination, the disposal of drilling spoils, and the fracturing of geological structures from the detonation. No fission products are emitted to the atmosphere.

FLIGHT TESTING

The government normally establishes flight ranges to test specific type systems from a dedicated facility. For the purpose of the Strategic Defense Initiative, flight testing can include missiles in ballistic flight trajectories or tests with objects in orbit.

Missile Range

Missile ranges consist of a launch area with launch pads and associated control and support facilities, a safety area around the launch area, and a controlled land/sea/air/space area for flight and impact. A missile range comprises large areas of the earth's surface and include tracking, communications and recovery facilities.

Orbit Range

Orbit ranges are an extension of missile ranges; however, additional tracking and communication sites are required to follow test vehicles in orbit. The Consolidated Space Operations Center would be the centralized facility for all space vehicle tracking information.

FINDING OF NO SIGNIFICANT IMPACT

STRATEGIC DEFENSE INITIATIVE ORGANIZATION
U.S. DEPARTMENT OF DEFENSE

AGENCY: Department of Defense

ACTION: Decision to conduct Demonstration/Validation tests of the Space-based Surveillance and Tracking System (SSTS).

BACKGROUND: Pursuant to Council on Environmental Quality Regulations for implementing the procedural provisions of the National Environmental Policy Act of 40 CFR Parts 1500-1508, and Department of Defense (DoD) Directive on Environmental Effects in the United States of DoD Actions, the DoD has conducted an assessment of the potential environmental consequences of Demonstration/Validation testing of the Space-based Surveillance and Tracking System developed by the Strategic Defense Initiative Organization.

SUMMARY: Demonstration/Validation would involve four types of tests: analyses, simulations, component/assembly tests, and flight tests. The locations of test activities for the Space-based Surveillance and Tracking System are:

FACILITY	TEST TYPE
California	
Vandenberg Air Force Base/ Western Test Range	Flight Tests
Colorado	
National Test Facility, Falcon Air Force Station	Analysis, Simulations
Florida	
Cape Canaveral Air Force Station/Eastern Test Range or Kennedy Space Center	Flight Tests
Nevada	
Nevada Test Site	Component/Assembly Tests

Tennessee

Arnold Engineering Development Center, Arnold Air Force Station	Simulations, Component/Assembly Tests

To determine the potential for significant environmental impacts of the Demonstration/Validation of the Space-based Surveillance and Tracking System, the magnitude and frequency of the tests that would be conducted at proposed test locations were compared to the current activities at those locations.

To assess impacts, the activity was evaluated in the context of the environmental considerations for air, water, biological resources, infrastructure, hazardous waste, land use, visual resources, cultural resources, noise, and socioeconomics. As a result of that evaluation, consequences were assigned to one of three categories: insignificant, mitigable, or potentially significant.

Environmental consequences were determined to be insignificant if no serious concerns existed regarding potential impacts of the potentially affected area. Consequences were deemed mitigable if concerns existed but it was determined that all of those concerns could be readily mitigated through standard procedures or by measures recommended in existing environmental documentation. If serious concerns were identified that could not be readily mitigated, the activity was determined to represent potentially significant consequences.

FINDING: No significant impacts would result from analyses, simulations, component/assembly testing and flight testing of the Space-based Surveillance and Tracking System.

FURTHER
INFORMATION: A copy of

Space-based Surveillance and Tracking System,
Demonstration/Validation Program,
Environmental Assessment,
July 1987

is available from

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